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NOTES ON THE CLADONIAE OF CONNECTICUT—II¹

ALEXANDER W. EVANS

A report on the Cladoniae of Connecticut, which was based on collections made down to the close of 1928, was published by the writer in 1930.² This report was supplemented two years later by a series of notes, which gave the results of explorations made in various parts of the State during the years 1929, 1930, and 1931, together with revisions of certain earlier records.³ The present series of notes represents a second supplement to the report. Although based largely on collections made in 1932 and 1933, it lists a few specimens of earlier date, in some cases correcting or revising published records. In the preparation of these notes the writer has again been privileged in having the kind coöperation of Dr. Heinrich Sandstede of Bad Zwischenahn, Oldenburg. Dr. Sandstede has determined many of the specimens listed and has examined most of the others. The writer would again express to him his grateful appreciation.

The writer is indebted also to the following botanists, who have kindly submitted specimens of Connecticut Cladoniae for determination: Mrs. J. W. Black of Mt. Carmel, Mr. B. Hartwell Clark of Hartford, Miss Margaret Fulford of Cincinnati, Mr. Ray Hansbrough of New Haven, Mrs. J. E. Hobbs of Mt. Carmel, Mr. A. D. McDonnell of New Haven, Mrs. F. H. Paine of Pomfret, and Mr. Jesse F. Smith of Suffield. In several instances these specimens have come from

¹ Contribution from the Osborn Botanical Laboratory. Published with aid to RHODORA from the National Academy of Sciences.

² Trans. Connecticut Acad. 30: 357-510. 1930.

³ Notes on the Cladoniae of Connecticut. RHODORA 34: 121-142, 153-164. 1932.

towns which the writer has not yet been able to visit and have thus appreciably added to our knowledge of local distribution within the State.

Two papers have recently been published which have a bearing on the Cladoniae of Connecticut. The first is by Kušan and deals with the species of the subgenus *Cladina* occurring in Jugoslavia.¹ These species are identical with the six recorded for Connecticut, but Kušan recognizes the specific validity of only three: *C. rangiferina*, *C. sylvatica*, and *C. alpestris*. He reduces the other three species to varietal rank under *C. sylvatica* and regards the true *C. sylvatica*, according to the definition of Sandstede, as a fourth variety. The true *C. sylvatica*, therefore, in Kusan's arrangement, becomes *C. sylvatica* var. *eusylvatica* Kušan, and the other three species become var. *mitis* (Sandst.) Kušan, var. *tenuis* (Harm.) Kušan, and var. *impexa* (Harm.) Kušan, respectively. He thus distinguishes the same taxonomic entities that Sandstede recognizes but gives some of them a more subordinate rank. In a general way his broad conception of *C. sylvatica* is in accordance with the views of Vainio. The segregations from this species, however, which we owe to the studies of Harmand and Sandstede, are becoming more and more widely recognized, and both *C. mitis* and *C. tenuis* are still listed below as distinct species; *C. impexa*, unfortunately, has not been collected in Connecticut during the past two years.

The other paper, which is more popular in character, is by Torrey and discusses the "Cladoniae in the range of the Torrey Botanical Club."² The region in question includes "New Jersey, eastern Pennsylvania, Long Island, and the Hudson Valley in New York as far north as the Catskills." Of the forty-three species recognized all but four have been reported from Connecticut. The paper gives keys to the groups and species represented, together with numerous descriptive and distributional notes; and the accompanying plates include illustrations of thirty-five species, several of which are represented by more than one form.

Forty-nine species of *Cladonia* were reported from Connecticut in 1932. In the present paper 4 additional species are reported, giving a new total of 53 species for the State. One species, unfortunately, which was included in the writer's original report, can

¹ Über die angebliche *Cladonia pycnoclada* (Gaudich.) Nyl. in Jugoslawien mit besonderen Berücksichtigung der nabestehenden Formen. *Hedwigia* 72: 42-54. 1932.

² *Torreyia* 33: 109-129. pl. 1-4. 1933.

no longer be considered a member of the Connecticut flora. This species is the widely distributed *C. cariosa* (Ach.) Spreng., which was recorded from Killingworth on the basis of a single collection made by Hall in 1874. Hall's material, when treated with KOH, fails to give the yellow color characteristic of *C. cariosa* and should, in the opinion of Dr. Sandstede, be referred to *C. alpicola* f. *minor*, under which name it is listed on page 49. Since *C. alpicola* is new to Connecticut, the total of 53 species for the State is not affected.

The sequence adopted in the present series of notes is the same as in the 1932 series and in the 1930 report; and all page-references, unless otherwise indicated, refer to this report. The 1932 series of notes is indicated by the word "Notes," and all species or forms reported for the first time from Connecticut are marked with asterisks. Stations listed with dates alone refer to collections made by the writer; in all other cases both dates and collector's names are given. Specimens from all the stations listed are preserved in the herbarium of Yale University.

Subgenus CLADINA

CLADONIA RANGIFERINA (L.) Web. (p. 375; Notes, p. 122). Avon (1933), Burlington (1933), Canton (1933), Cheshire (1932), East Haddam (*Hansbrough*, 1933), Guilford (1932), Hebron (1933), Lebanon (1932), Litchfield (1933), Marlboro (1933), Meriden (1933), and Simsbury (1933).

CLADONIA RANGIFERINA f. TENUIOR (Del.) Mass. (Notes, p. 122). Burlington (1933) and Middletown (1932), both determined by Sandstede.

CLADONIA RANGIFERINA f. CRISPATA Coem. (p. 377; Notes, p. 122). Cheshire (1932) and Middletown (1932), both determined by Sandstede.

*CLADONIA RANGIFERINA f. HUMILIS Anders, Mitt. Nordböhm. Ver. Heimatsforsch und Wanderpflege 40: 69. 1917; Hedwigia 61: 356. 1920. On exposed banks, Middlefield (1932, det. Sandstede). First record for North America.

The podetia are darkened by the sunlight and form small depressed colonies, which have a more or less circular outline.

*CLADONIA RANGIFERINA f. UMBELLATA Anders, Strauch- und Laubfl. Mitteleuropas 54. pl. 5, f. 1. 1928. On earth in open fields. Hartland (1933) and Simsbury (1933). The latter specimen was determined by Sandstede and represents the first record for Connecticut. New to North America.

The ultimate branchlets in f. *umbellata* are arranged in radiating whorls around gaping axils. These branchlets, for the most part, are

straight or only slightly curved, instead of being distinctly curved in one direction, as in the usual forms of the species.

*CLADONIA RANGIFERINA f. PATULA Flot. in Sandstede, Abhandl. Naturw. Ver. Bremen 25: 98. 1922; Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 35. *pl. 1, f. 6*. 1931. On earth in field, Hartland (1933, det. Sandstede). First record for North America.

The podetia of f. *patula* are characterized by bearing spermagonia in abundance. These are very dark in color and terminate branchlets surrounding open axils. In the preceding form the ultimate branchlets are mostly sterile.

*CLADONIA RANGIFERNA f. SETIGERA Oxner in Sandstede, Clad. Exsic. Bericht. Uebersicht 34. 1930; Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 38. *pl. 1, f. 3*. 1931. In open woods, Simsbury (1933, det. Sandstede). New to North America.

The hair-like or bristle-like outgrowths found in f. *setigera* are scattered or fasciculate and vary in color from whitish to blackish. They are particularly in evidence at the tips of spermagonial branchlets. The form is a homologue of *C. tenuis* f. *setigera*.

CLADONIA SYLVATICA (L.) Hoffm. (p. 378; Notes, p. 123). Avon (1933), Canterbury (1933), Canton (1933), East Hampton (McDonnell, 1932, det. Sandstede), Griswold (1933), Guilford (1932, det. Sandstede), Killingworth (Hall, 1874, det. Sandstede, not previously reported; Evans, 1932), Middletown (1932), and Volun-town (1933).

*CLADONIA SYLVATICA f. SCABROSA Leight. Lichen-Flora Great Britain, etc. 66. 1879. On earth in field, Hartland (1933, det. Sandstede). First record for North America.

The podetial surface in f. *scabrosa*, especially in the older parts, is densely verruculose. This condition is apparently associated with old age.

CLADONIA SYLVATICA f. PYGMAEA Sandst. (p. 381; Notes, p. 123). Killingworth (1932).

CLADONIA SYLVATICA f. SPHAGNOIDES (Floerke) Oliv. (p. 380). East Haddam (1933).

CLADONIA MITIS Sandst. (p. 381; Notes, p. 123). Barkhamsted (McDonnell, 1933, det. Sandstede), Canterbury (1933, det. Sandstede), Cheshire (1932), Durham (1932), East Haddam (1933), Griswold (1933), Hebron (1933), Killingworth (1932), Milford (1932), Portland (1932), Simsbury (1933), Suffield (Smith, 1933), Wallingford (1932), Windsor (1933), and Wolcott (1933).

CLADONIA MITIS f. DIVARICATA Sandst. (p. 383). Avon (1933, det. Sandstede), East Hampton (1932), Franklin (1932), Killingworth (1932), Middletown (1932), and Simsbury (1933).

CLADONIA MITIS f. PROLIFERA Sandst. (p. 383; Notes, p. 123).

Avon (1933, det. Sandstede), Cheshire (1932), Franklin (1932), Guilford (1932), Hebron (1933), and Killingworth (1932).

*CLADONIA MITIS f. SORALIFERA Sandst. Abhandl. Naturw. Ver. Bremen 25: 111. 1922 (as modification); in Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 61. pl. 3, f. 3. 1931 (as form). Sand plain, North Haven (*Miss Fulford*, 1932). This interesting form was collected by Robbins at Wareham, Massachusetts, in 1924, but no record for North America has heretofore been published.

The soredia, which are characteristic of f. *soralifera*, are grayish or yellowish in color and form conspicuous but irregular masses on the surface of the podetia. The plants bearing the soredia are prostrate or ascending and present the appearance of being poorly developed. *Cladonia mitis* is a species which does not usually produce soredia. In commenting on the sorediose forms of such species Du Rietz¹ notes that they are apparently constant in character, since they grow mixed with plants lacking soredia. He brings out the difficulty of deciding whether they arise by mutation or otherwise and emphasizes their failure to reproduce efficiently. This has prevented them from becoming independent species.

CLADONIA TENUIS (Floerke) Harm. (p. 384; Notes, p. 123). Avon (1933), Burlington (1933), Canterbury (1933), Canton (1933), Cheshire (1932), Franklin (1932), Griswold (1933, in part det. Sandstede), Harwinton (1933), Killingworth (1932), Lebanon (1932), Marlboro (1933), Meriden (1933), Middlefield (1932), Middletown (1932), Monroe (1933), Simsbury (1933), Southington (1932), Stafford (1932), Suffield (*Smith*, 1933), Voluntown (1933, det. Sandstede), Willington (1932), and Wolcott (1933).

CLADONIA TENUIS f. SETIGERA Sandst. (Notes, p. 123). Burlington (1933), Canterbury (1933), Franklin (1932), Griswold (1933), Marlboro (1933), Simsbury (1933), Voluntown (1933), and Wethersfield (*Clark*, 1933).

CLADONIA TENUIS f. PROLIFERA Sandst. (Notes, p. 123). Harwinton (1933).

Subgenus PYCNOTHELIA

CLADONIA PAPILLARIA (Ehrh.) Hoffm. f. MOLARIFORMIS (Hoffm.) Schaer. (p. 390; Notes, p. 123). Avon (1933), Burlington (1933), Cheshire (1932), Franklin (1932), Griswold (1933), Meriden (1933), Milford (1932), Simsbury (1933), and Willington (1932).

CLADONIA PAPILLARIA f. STIPATA Floerke (p. 391; Notes, p. 123), Killingworth (1932) and Madison (1933).

CLADONIA PAPILLARIA f. PAPILLOSA Fr. (p. 391; Notes, p. 123). Burlington (1933), East Haddam (1933), Franklin (1932), Griswold (1933), Meriden (1933), Simsbury (1933), and Willington (1932).

¹ Svensk Bot. Tidskr. 18: 388. 1924.

CLADONIA PAPILLARIA f. PROLIFERA Schaer. (Notes, p. 124). Hamden (*Mrs. Hobbs*, 1933).

Subgenus CENOMYCE

Section COCCIFERAE

Subsection SUBGLAUCESCENTES

CLADONIA FLOERKEANA (Fr.) Floerke var. CARCATA (Ach.) Vainio (p. 394; Notes, p. 124). Harwinton (1933) and Voluntown (1933).

CLADONIA FLOERKEANA var. INTERMEDIA Hepp (p. 393; Notes, p. 124). Canton (1933), Hartland (1933), Harwinton (1933), Voluntown (1933), and Wolcott (1933).

CLADONIA BACILLARIS (Ach.) Nyl. (p. 395; Notes, p. 124). Barkhamsted (1933), Burlington (1933), Canterbury (1933), Canton (1933), Griswold (1933), Harwinton (1933), Hebron (1933), Killingworth (1932), Marlboro (1933), Middletown (1932), Monroe (1932), Portland (*Evans*, 1933; *Clark*, 1933), Simsbury (1933), Trumbull (1933, det. Sandstede), Voluntown (1933), and Wolcott (1933).

CLADONIA BACILLARIS f. CLAVATA (Ach.) Vainio (p. 397; Notes, p. 124). Bristol (1933), Burlington (1933), Canton (1933), East Haddam (1933), Franklin (1932), Harwinton (1933), Salisbury (1932, det. Sandstede), Simsbury (1933), and Thomaston (1933).

*CLADONIA BACILLARIS f. MONSTROSA Harm. Lich. France 3: 337. 1907. On soil over wood, Guilford (*Miss Fulford*, 1932, det. Sandstede). First record for North America.

The podetia of f. *monstrosa* are somewhat like those of the preceding form but are variously curved and swollen and may be sparingly branched.

*CLADONIA BACILLARIS f. SUBTOMENTOSULA Sandst. Abhandl. Naturw. Ver. Bremen 25: 129. 1922 (as modification); in Anders, Strauch- und Laubfl. Mitteleuropas 61. 1928 (as form). On earth, more rarely on logs. Killingworth (1932, det. Sandstede), Middletown (1932, det. Sandstede), Salisbury (1932, det. Sandstede), and Voluntown (1933).

The robust podetia of f. *subtomentosula* are about 2 cm. high and gradually broaden out in the upper part, where they may attain a diameter of 2 mm. They are either simple and rounded at the apex or broken up into a few short and rounded branches. The whole apical surface is densely farinose-sorediose, and the soredia vary in color from whitish gray to pale greenish. The apothecia, if present at all, are minute and immersed, but many of the podetia are completely sterile. The form bears a certain resemblance to f. *clavata* and f. *peritheta* (Wallr.) Arn. (p. 397) but is more densely sorediose than either.

*CLADONIA BACILLARIS f. PITYROPODA Nyl. in Crombie, Grevillea

11: 115. 1883 (*nomen nudum*); Crombie, Monogr. Lich. Britain 1: 172. 1894. On rich soil in spruce woods, Salisbury (1932, det. Sandstede). New to North America.

This interesting form is characterized by the presence of squamules on the podetia. They are found, not only in the basal portion, where their occurrence would not be unusual, but also in the apical portion. In the latter position they are frequently interspersed among the apothecia. Typical podetia of f. *pityropoda* are more or less curved, and additional squamules may be developed on the convex side of the curvature. A narrow squamulose band is thus formed, connecting in some cases the squamulose region at the base with the squamulose region at the apex. The presence of squamules indicates the presence of cortex and at once raises the question whether f. *pityropoda* should be included under *C. bacillaris* or *C. Floerkeana*. In separating these two species Vainio laid emphasis on differences in the distribution of the cortex. According to his account¹ the podetial cortex in *C. bacillaris* is almost entirely restricted to the basal region, and any squamules that may be present are similarly restricted. In *C. Floerkeana*, on the other hand, the cortex is better developed and is found throughout the entire length of the podetium, either as a continuous layer or in the form of more or less clearly defined patches; and squamules, if present at all, show a similar distribution. On the basis of this distinction f. *pityropoda* should be referred to *C. Floerkeana*, and Vainio² included it among the synonyms of *C. Floerkeana* var. *carcata*. Harmand,³ however, in separating *C. Floerkeana* from *C. bacillaris*, emphasized differences in the size of the soredia. If these are large enough to be called granular, *C. Floerkeana* is indicated; if small enough to be called farinose, the plants should be referred to *C. bacillaris*. Sandstede⁴ employs a similar distinction in his key, when he separates *C. Floerkeana* var. *intermedia*, with granular soredia, from *C. bacillaris*, with farinose soredia. Apparently because the soredia of f. *pityropoda* are farinose, rather than granular, he includes the form under *C. bacillaris*.⁵

*CLADONIA BACILLARIS f. TENUISTIPITATA Sandst. Abhandl. Naturw. Ver. Bremen 25: 130. 1922 (as modification); in Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 106. pl. 6, f. 8. 1931 (as form). On earth in a field, Voluntown (1933, det. Sandstede). New to North America.

¹ Acta Soc. F. et Fl. Fennica 4: 74, 90. 1887.

² Ibid. 10: 441. 1894.

³ Lich. France 3: 337. 1907.

⁴ In Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 19. 1931.

⁵ Op. cit. 105; also Abhandl. Naturw. Ver. Bremen 18: 400. 1906; 25: 129. 1922.

The podetia of *f. tenuistipitata* are long and slender and are either simple or sparingly branched, with slender ascending or suberect branches. The diameter, although variable, rarely exceeds 0.5 mm. According to Sandstede the form is often associated with *C. macilenta*.

CLADONIA BACILLARIS f. SOREDIATA Sandst. (Notes, p. 125). Canton (1933) and Hamden (*Mrs. Black & Mrs. Hobbs*, 1933).

CLADONIA BACILLARIS f. ABBREVIATA (Vainio) Harm. (Notes, p. 124). Killingworth (1932), Meriden (1933), Middlefield (1932), Middletown (1932), and North Haven (1931, not previously reported). With a single exception these records are based on determinations made by Sandstede.

CLADONIA MACILENTA f. STYRACELLA (Ach.) Vainio (p. 399; Notes, p. 125). Barkhamsted (1933), Bristol (1933), Canton (1933), East Hampton (1932), Franklin (1932), Harwinton (1933), Killingworth (1932), Lebanon (1933), Monroe (1933), Salisbury (1932), and Windsor (1933).

CLADONIA MACILENTA Hoffm. *f. GRANULOSA* Aigr. (p. 400; Notes, p. 125). Durham (1932) and Salisbury (1932).

Subsection STRAMINEO-FLAVIDAE

CLADONIA PLEUROTA (Floerke) Schaer. (p. 400; Notes, p. 125). Avon (1933), Burlington (1933), Canton (1933), Cheshire (1932), Colchester (1932), East Haddam (1933), Franklin (1932), Griswold (1933), Guilford (1932), Hebron (1933), Killingworth (1932), Middletown (1932), Milford (1932), Newington (*Clark*, 1933), Pomfret (*Mrs. Paine*, 1933), Voluntown (1933), Wethersfield (*Clark*, 1933), Windsor (1933), and Wolcott (1933).

CLADONIA PLEUROTA f. DECORATA Vainio (p. 402; Notes, p. 127). East Haddam (1933), Hamden (*Mrs. Black & Mrs. Hobbs*, 1933), and Windsor (1933).

CLADONIA PLEUROTA var. *FRONDESCENS* (Nyl.) Oliv. (p. 403; Notes, p. 128). Colchester (1932), Hamden (*Mrs. Black & Mrs. Hobbs*), and Middletown (1932).

CLADONIA PLEUROTA f. CERINA (Nagel) Oliv. (Notes, p. 128). Barkhamsted (1933, with apothecia) and East Haddam (1933, with spermagonia). The apothecial condition of this form has not previously been reported from Connecticut.

CLADONIA PLEUROTA f. ALBIDA Vainio (Notes, p. 128). Bristol (1933), Burlington (1933, det. Sandstede), Canton (1933, det. Sandstede), Harwinton (1933), and Monroe (1933, det. Sandstede).

CLADONIA CRISTATELLA Tuck. (p. 403; Notes, p. 128). Portland (1933), Willington (1933), and Windsor (1933).

CLADONIA CRISTATELLA f. BEAUVOISII (Del.) Vainio (p. 405; Notes, p. 128). Ashford (*Clark*, 1933), Barkhamsted (1933), Burlington (1933), Canterbury (1933), Canton (1933), East Haddam (*Clark*, 1933), Franklin (1932), Griswold (1933), Hamden (*Eaton*, 1866, not

previously reported, first record for town), Harwinton (1933), Lebanon (1932), Marlboro (1933), Newington (*Clark*, 1933), Simsbury (1933), Stafford (1932), Thomaston (1933), Voluntown (*Nichols*, 1933), Watertown (1933), Wethersfield (*Clark*, 1933), Willington (1932), and Wolcott (1933).

CLADONIA CRISTATELLA f. VESTITA Tuck. (p. 407; Notes, p. 129). Ashford (*Clark*, 1933), Burlington (1933), Canterbury (1933), Canton (1933), Columbia (1933), East Haddam (*Clark*, 1932; *Evans*, 1933), Griswold (1933), Harwinton (1933), Killingworth (1932), Lebanon (1932), Marlboro (1933), Middletown (1932), Monroe (1933), Newington (*Clark*, 1933), Portland (1933), Simsbury (1933), Suffield (*Smith*, 1933), Thomaston (1933), Watertown (1933), Wethersfield (*Clark*, 1933), Willington (1932), and Wolcott (1933).

CLADONIA CRISTATELLA f. SQUAMOSISSIMA Robbins (p. 408; Notes, p. 129). Durham (1932) and East Haddam (1933).

CLADONIA CRISTATELLA f. PLEUROCARPA Robbins (p. 408; Notes, p. 129). Barkhamsted (1933), East Haddam (1933), Hamden (*Mrs. Black & Mrs. Hobbs*, 1933), Lebanon (1932), Stafford (1932), and Watertown (1933).

CLADONIA CRISTATELLA f. *scyphulifera* Sandst. f. nova, podetia apice verticillatim ramosa, ramis apothecis terminatis, plus minusve unitis et scyphos irregulares formantibus, cavitatis haud profundis.

On earth and old wood. Canton (1933), Killingworth (1933), Lebanon (1932), Meriden (1933), and Windsor (1933). Most of these determinations have been made or verified by Sandstede.

The writer (p. 404) has already called attention to the fact that the podetia of *C. cristatella*, in some cases, are terminated by shallow cup-like expansions formed by whorls of branches. Dr. Sandstede now suggests that plants bearing podetia of this character be distinguished as f. *scyphulifera*. Under the most typical condition the branches are subequal in length and coalescent throughout the greater part of their extent, so that the apothecia appear sessile or short-stipitate on the margins of the expansions. In most cases, however, the branches are unequal in length and irregularly coalescent, so that the expansions become less cup-like. The podetial surface is smooth or sparingly squamulose.

CLADONIA CRISTATELLA f. *aurantiaca* Robbins, f. nova, apothecia *aurantiaca*.

On earth and old wood. Voluntown (*Nichols*, 1933) and Windsor (1933, first record for Connecticut).

The orange-colored apothecia of f. *aurantiaca* are intermediate in color between the vivid scarlet apothecia of the typical forms of the species and the pale apothecia of f. *ochrocarpia* and f. *squamulosa*. The form was named in manuscript by Mr. Robbins.

CLADONIA CRISTATELLA f. OCHROCARPIA Tuck. (p. 409). Canton (1933), Madison (1933), Watertown (1933), and Windsor (1933).

CLADONIA CRISTATELLA f. SQUAMULOSA Robbins (p. 410; Notes, p. 129). Ashford (Clark, 1933) and Marlboro (1933).

CLADONIA INCRASSATA Floerke (Notes, p. 129). Branford (1932), Franklin (1932), Griswold (1933), Meriden (1933), Middletown (1932), Portland (1933), Salisbury (1932), Voluntown (1933), and Willington (1932).

CLADONIA INCRASSATA f. SQUAMULOSA (Robbins) Evans (Notes, p. 129). Branford (1932) and Griswold (1933).

Section OCHROPHAEAE

Subsection UNCIALES

CLADONIA UNCIALIS (L.) Web. (p. 413; Notes, p. 131). Berlin (Clark, 1932), Cheshire (1932), Griswold (1933), Hartford (Clark, 1933), Hartland (1933), Madison (1933), Marlboro (1933), Monroe (1933), Portland (1933), and Thomaston (1933).

CLADONIA UNCIALIS f. DICRAEA (Ach.) Vainio (p. 416; Notes, p. 133). Pomfret (Mrs. Paine, 1933, det. Sandstede).

CLADONIA UNCIALIS f. OBTUSATA (Ach.) Nyl. (p. 415). Killingworth (Hall, 1874, det. Sandstede, not previously reported).

CLADONIA UNCIALIS f. SETIGERA Anders (Notes, p. 134). Bristol (1933), Canton (1933), Guilford (1932), Killingworth (1932), Middletown (1932), Salisbury (1932, det. Sandstede), and Simsbury (1933).

CLADONIA UNCIALIS f. SPINOSA Oliv. (p. 417; Notes, p. 133). Guilford (1932), Hartford (Clark, 1933), and Middletown (1932).

*CLADONIA UNCIALIS f. SORALIGERA Robbins, RHODORA 26: 147. 1924 (as modification); Sandstede, in Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 190. 1931 (as form). On earth over rocks. Canton (1933), Guilford (1932, first authentic record for Connecticut), Killingworth (1932), and Middletown (1932).

As shown on p. 414 of the writer's report the record for f. *soraligera* in the "Catalogue of the Lichens of Connecticut," p. 23, was based on an incorrect determination. The form was originally described from specimens collected by Robbins at Wareham, Massachusetts, and distributed by Sandstede in his *Cladoniae Exsiccatæ*, No. 1217.

The soredia of f. *soraligera*, which is a homologue of *C. mitis* f. *soralifera*, form irregular yellowish masses, 1-12 mm. in diameter, on the surface of the podetia. In the material from Connecticut the plants are prostrate and poorly developed, but Robbins states that the sorediate condition may sometimes be associated with erect plants.

CLADONIA CAROLINIANA (Schwein.) Tuck. f. DILATATA Evans (Notes, p. 138). Berlin (Clark, 1932), Canterbury (1933), East Haddam

(1933), Griswold (1933), Guilford (*Miss Fulford*, 1932; *Evans*, 1932), Middletown (1932), North Haven (*Miss Fulford*, 1932), Simsbury (1933), Thomaston (1933), and Woodbridge (*Eaton*, 1875, not previously reported).

CLADONIA CAROLINIANA f. FIBRILLOSA Evans (Notes, p. 139). Griswold (1933), Killingworth (*Hall*, 1875, mixed with f. *dilatata*; see Notes, p. 138), and Woodbridge (*Eaton*, 1875, not previously reported).

CLADONIA CAROLINIANA f. TENUIRAMEA Evans (Notes, p. 139). Bristol (1933), East Haddam (1933), East Hampton (1932), Griswold (1933), Middletown (1932), Simsbury (1933), and Thomaston (1933).

CLADONIA CAROLINIANA f. PROLIFERA Evans (Notes, p. 139). Bethany (*Miss Fulford*, 1932), Guilford (1932), Killingworth (1932), Middlefield (1932), Middletown (1932), and Thomaston (1933).

CLADONIA BORYI Tuck. f. RETICULATA (Russell) Merrill (Notes, p. 141). Griswold (1933), Killingworth (1932), Middletown (1933), and Simsbury (1933).

CLADONIA BORYI f. LACUNOSA (Bory) Tuck. (p. 418; Notes, p. 141). Killingworth (1932) and Simsbury (1933).

CLADONIA BORYI f. PROLIFERA Robbins (p. 419). East Haddam (*Clark*, 1932).

Subsection CHOSMARIAE

Group MICROPHYLLAE

CLADONIA FURCATA (Huds.) Schrad. (p. 420; Notes, p. 153). Killingworth (1932), Monroe (1933), and Wethersfield (*Clark*, 1933). These records are based on specimens which are indefinite as to form.

CLADONIA FURCATA var. RACEMOSA (Hoffm.) Floerke (p. 422; Notes, p. 153). Canton (1933), Coventry (*Clark*, 1933), East Haddam (1933), Hartland (1933), Hebron (1933), Killingworth (*Hall*, 1874, det. Sandstede, not previously reported), Litchfield (1933), Marlboro (1933), Meriden (1933), Pomfret (*Mrs. Paine*, 1933), Portland (1933), and Voluntown (1933, det. Sandstede).

CLADONIA FURCATA var. RACEMOSA f. FURCATOSUBULATA (Hoffm.) Vainio (p. 422; Notes, p. 153). Branford (1932, det. Sandstede), Canton (1933, det. Sandstede), Durham (1932), East Haddam (1933), Griswold (1933), Killingworth (1933, det. Sandstede), Lebanon (1932), and Voluntown (1933, det. Sandstede).

CLADONIA FURCATA var. RACEMOSA f. CORYMBOSA (Ach.) Vainio (p. 433; Notes, p. 153). Litchfield (1933).

CLADONIA FURCATA var. RACEMOSA f. FISSA (Floerke) Aigret (Notes, p. 153). Killingworth (1932; 1933, det. Sandstede) and Portland (1933).

*CLADONIA FURCATA var. RACEMOSA f. ARBUSCULA (Floerke) Anders, Strauch- und Laubfl. Mitteleuropas 73. pl. 8, f. 8. 1928 (as modification); Sandstede in Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 198. 1931 (as form). *C. furcata* ♂ *fissa* subvar. *arbuscula* Floerke, Clad. Comm. 152. 1828. *C. furcata* var. *corymbosa* f. *arbuscula* Zahlbr.

Cat. Lich. Univ. 4: 527. 1927. On earth in open woods, Branford (1932, det. Sandstede).

The podetia of *f. arbuscula* are fertile, as in *f. corymbosa*, but the branches bearing the apothecia form loose spreading clusters; in *f. corymbosa* the clusters are more compact.

CLADONIA FURCATA var. RACEMOSA *f. SUBCLAUSA* Sandst. (p. 423). Canterbury (1933), East Haddam (1933), and Essex (1931, not previously reported). The determinations were made or verified by Sandstede.

CLADONIA FURCATA var. RACEMOSA *f. SQUAMULIFERA* Sandst. (Notes, p. 153). Canton (1933), Durham (1932, det. Sandstede), East Haddam (1933), Goshen (*Miss Sudbury*, 1927, not previously reported), Killingworth (1932), Litchfield (1933), Madison (1931, listed in Notes as from Killingworth; *Clark*, 1932), Marlboro (1933), New Haven (*Nichols*, 1909, listed in Report, p. 424, as var. *pinnata*), Salisbury (1932, det. Sandstede), and Stafford (1932, det. Sandstede).

CLADONIA FURCATA var. PALAMAEA (Ach.) Vainio (p. 425; Notes, p. 154). Branford (1932), Durham (1932), Killingworth (1932, det. Sandstede), Lebanon (1933), and Middlefield (1932, det. Sandstede).

*CLADONIA FURCATA var. PALAMAEA *f. IMPLEXA* (Floerke) Aigret, Bull. Soc. Roy. Bot. Belgique 40: 114. 1901 (as *C. furcata* $\hat{=}$ *palamaea* dd. *implexa*); Zahlbruckner, Cat. Lich. Univ. 4: 528. 1927 (as form). *C. furcata f. implexa* Floerke, Clad. Comm. 146. 1828. On earth in field, Hebron (1933, det. Sandstede).

The plants in *f. implexa* form prostrate dark brown colonies. The podetia grow in all directions and are intricately branched and interwoven.

CLADONIA FURCATA var. PALAMAEA *f. SUBULATA* (Ach.) Vainio (p. 425). Guilford (1932, det. Sandstede).

*CLADONIA FURCATA var. PALAMAEA *f. RIGIDULA* (Mass.) Oliv. Mém. Soc. Sci. Nat. Math. Cherbourg 36: 128. 1907. On rocks, Guilford (1932).

In the writer's report, p. 426, the present form is recorded as a variety of *C. furcata*, following the example of Vainio. Both Sandstede and Anders, however, now agree with Olivier in regarding it as a form of var. *palamaea*. The presence of squamules on the podetia make it a homologue of var. *racemosa f. squamulifera*.

CLADONIA FURCATA var. PINNATA (Floerke) Vainio (p. 424). Canton (1933) and New Haven (*Hall*, 1874, det. Sandstede, not previously reported).

CLADONIA FURCATA var. PINNATA *f. FOLIOLOSA* (Del.) Vainio (p. 424; Notes, p. 154). Portland (1933).

*CLADONIA FURCATA var. PINNATA *f. recurva* (Hoffm.) Zahlbr. Cat. Lich. Univ. 4: 531. 1927. *C. furcata C. recurva* Hoffm. Deutschl.

Fl. 2: 115. 1796. New Haven (*Hall*, 1874, det. Sandstede, not previously reported).

Some of the podetial branches in f. *recurva* are attenuate and more or less strongly curved, thus giving the plants a peculiar appearance. Specimens from Fayette, Iowa, collected by Fink in 1894, have been distributed in Sandstede's *Cladoniae Exsiccatae*, No. 664.

*CLADONIA FURCATA var. PINNATA f. TURGIDA (Scriba) Sandstede in Rabenhorst, *Kryptogamen-Flora* 9, Abt. 4²: 211. 1931. *C. furcata* f. *turgida* Scriba in Sandstede, *Clad. Exsic. 1000*. 1923. Among mosses in a *Chamaecyparis* bog, Killingworth (1933). New to North America.

The podetia of f. *turgida*, which has a wide distribution in Europe, are irregularly branched and swollen. The ultimate branches, in many cases, are more or less incurved and may be pointed and sterile or tipped with apothecia. The podetial squamules vary greatly in abundance and may be almost lacking.

CLADONIA SCABRIUSCULA (Del.) Leight. f. FARINACEA (Vainio) Sandstede (p. 427; Notes, p. 154). Canton (1933), Durham (1932), Killingworth (1933), Lebanon (1932, 1933), Litchfield (1933), Meriden (1933), Portland (1933), Voluntown (1933), and West Hartford (*Clark*, 1932).

CLADONIA MULTIFORMIS Merrill f. FINKII (Vainio) Evans (p. 429; Notes, p. 154). Canton (1933) and Hartland (1933).

CLADONIA MULTIFORMIS f. SIMULATA Robbins (p. 429). Canton (1933).

CLADONIA MULTIFORMIS f. SUBASCYPHA (Vainio) Evans (p. 430). Killingworth (1933).

CLADONIA MULTIFORMIS f. SUBTESTACEA (Vainio) Evans (p. 430). Canton (1933).

CLADONIA SQUAMOSA (Scop.) Hoffm. (p. 432; Notes, p. 154). Canton (1933), Guilford (1932), Hartland (1933), Hebron (1933), Killingworth (1933), Portland (1933), Stafford (1932), and Voluntown (1933). The specimens upon which these records are based are not referable to definite forms.

CLADONIA SQUAMOSA f. DENTICOLLIS (Hoffm.) Floerke (p. 434; Notes, p. 154). Ashford (*Clark*, 1933), Canton (1933, det. Sandstede), Harwinton (1933, det. Sandstede), Harwinton (1933, det. Sandstede), Madison (1931, listed in Notes as from Killingworth), and Salisbury (1932, det. Sandstede).

CLADONIA SQUAMOSA f. SQUAMOSISSIMA Floerke (p. 434). Salisbury (1932).

CLADONIA SQUAMOSA f. MURINA Scriba (p. 437). Hamden (*Mrs. Black & Mrs. Hobbs*, 1933, det. Sandstede), Killingworth (1933, det. Sandstede), Middletown (1932), and Salisbury (1932, det. Sandstede).

*CLADONIA SQUAMOSA f. CALLOSA (Del.) Anders, Strauch- und

Laubfl. Mitteleuropas 81. 1928 (as var. *denticollis* f. *callosa*). *Cenomyce callosa* Del. Ms. *Cladonia pyxidata* 2) *callosa* Nyl. in Ohlert, Schr. Königl. Physikal.-Ökonom. Ges. Königsberg 11: 5. 1871. *C. callosa* Harm. Lich. France 3: 326. 1907. On rocks. Guilford (1932, first collection for the State) and Middlefield (1932), both determined by Sandstede. New to North America.

The plants of f. *callosa* form compact cushions, approximately hemispherical in shape, on the surface of rocks. The densely crowded squamules are narrow and 3-10 mm. in length, and most of the colonies are sterile throughout. Some of the earlier writers associated f. *callosa* with *C. pyxidata*, but Sandstede¹ showed that it lacked the bitter taste characteristic of *C. pyxidata* and its allies. Comparison of the plant with depauperate forms of the mild-tasting *C. squamosa* convinced him that f. *callosa* should be included under that species, and it was soon definitely placed there by Anders, as indicated in the synonymy.

CLADONIA SQUAMOSA f. PHYLLOCOMA (Rabenh.) Vainio (p. 434; Notes, p. 154). Hamden (*Mrs. Black & Mrs. Hobbs*, 1933) and Stafford (1932), both determined by Sandstede.

*CLADONIA SQUAMOSA f. CLAVARIELLA Vainio, Acta Soc. F. et Fl. Fennica 4: 443. 1887; Zahlbruckner, Cat. Lich. Univ. 4: 595. 1927 (as variety). On banks, rocks, and logs. Canton (1933), Hartland (1933), Litchfield (1933), and Voluntown (1933). The determinations were made by Sandstede. Not before reported from North America.

The podetia, as brought out by Vainio's original description and by the later description of Sandstede,² are cupless, irregularly branched, 7-25 mm. in height, 0.7-2 mm. in diameter, and blunt at their apices. Throughout the greater part of their length they are densely covered with small squamules, among which a few larger squamules may be interspersed. Toward the tips of the podetia the surface is more or less decorticate and presents a somewhat granulose appearance. In many cases the more typical podetia of f. *clavariella* are associated with plants in which the distinctive peculiarities of the form are only partially realized.

*CLADONIA SQUAMOSA f. PHYLLOPODA Vainio, Acta Soc. F. et Fl. Fennica 4: 441. 1887. *C. squamosa* var. *muricella* f. *phyllopoda* Oliv. Mem. Soc. Sci. Nat. Math. Cherbourg 36: 133. 1907. On rocks. Milford (1931, det. Sandstede, not previously reported) and Wolcott (1933, det. Sandstede). New to North America.

The primary thallus in f. *phyllopoda* is persistent and well-developed, being formed (according to Vainio's account) of squamules

¹ Abhandl. Naturw. Ver. Bremen 25: 214. 1922.

² In Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 273. 1931.

3–5 mm. long and 2–3 mm. wide. The podetia which are only 2–8 mm. in height, are poorly developed and variable. In some cases they are subulate, in others more or less distinctly cup-forming, and the surface is either sparingly squamulose or smooth.

CLADONIA SQUAMOSA f. LEVICORTICATA m. RIGIDA (Del.) Evans (p. 435; Notes, p. 154). Middletown (1932, det. Sandstede).

*CLADONIA CARASSENSIS Vainio, Acta Soc. F. et Fl. Fennica 4: 313. 1887. On log in Chamaecyparis swamp, Stafford (1932, det. Sandstede).

The original material of *C. carassensis* was collected "in montibus Carassae," Brazil, by Vainio in 1885. Nearly forty years later Robbins found the species at Wareham, Massachusetts, and based two new forms and a new modification on his specimens.¹ The discovery of the species in Connecticut represents an interesting addition to the flora of the State.

In its general appearance *C. carassensis* bears a strong resemblance to certain forms of *C. crispata* (Ach.) Flot. and *C. squamosa* but is distinguished from both by giving a distinct yellow reaction with KOH. It agrees in this respect with *C. subsquamosa* (Nyl.) Vainio, another northern species with open cups. In *C. subsquamosa*, however, the podetial surface is more or less granular, whereas in *C. carassensis* the surface is smooth throughout. Since *C. subsquamosa* has been reported from Quebec and the State of Washington, it is perhaps to be expected in Connecticut.

The specimens from Stafford are much like f. *subregularis* Vainio, one of the two Massachusetts forms described by Robbins. They agree in having podetia 20–40 mm. high, with moderately dilated cups and a surface free or nearly so from squamules. The color of the podetia, however, instead of being a mixture of glaucescent and olivaceous shades, as in f. *subregularis*, is uniformly grayish except at the tips of the branches. For this reason the Stafford specimens are referred simply to the species.

CLADONIA CENOTEAE (Ach.) Schaer. f. EXALTATA Nyl. (Notes, p. 155). Willington (Clark, May 30, 1932; Evans, June 4, 1932), the second station for the State.

CLADONIA DELICATA (Ehrh.) Floerke f. QUERCINA (Pers.) Vainio (p. 439; Notes, p. 156). Durham (1932), Killingworth (1932), and Voluntown (1933).

CLADONIA CAESPITICIA (Pers.) Floerke (p. 439; Notes, p. 156). Bristol (1933), Burlington (1933), Canton (1933), East Haddam (1933), Guilford (Clark, 1933), Harwinton (1933), Killingworth

¹ RHODORA 26: 146, 147. 1924.

(1932), Southington (1932), Voluntown (1933), and Watertown (1933).

Group MEGAPHYLLAE

CLADONIA APODOCARPA Robbins (p. 440; Notes, p. 156). Canton (1933), Cheshire (1932), Colchester (1933), Durham (1932), Guilford (*Miss Fulford*, 1932; *Evans*, 1932), Harwinton (1933), Killingworth (1932), Marlboro (1933), Middlefield (1932), Middletown (1932), Newington (*Clark*, 1933), and Suffield (*Smith*, 1933).

CLADONIA TURGIDA (Ehrh.) Hoffm. (p. 441). Salisbury (1932).

CLADONIA TURGIDA f. SCYPHIFERA Vainio (p. 442). Hartland (1933).

CLADONIA TURGIDA f. CORNICULATA Floerke (p. 442). Salisbury (1932).

Subsection CLAUSAE

Group PODOSTELIDES

Subgroup HELOPODIUM

CLADONIA MITRULA Tuck. f. IMBRICATULA (Nyl.) Vainio (p. 444; Notes, p. 156). Burlington (1933), Canton (1933), Columbia (1933), Killingworth (1932), Meriden (1933), Portland (1933), Suffield (*Smith*, 1933), Thomaston (1933), Voluntown (1933), Watertown (1933), and Wethersfield (*Clark*, 1933).

CLADONIA CLAVULIFERA Vainio f. NUDICAULIS Evans (p. 447; Notes, p. 156). Burlington (1933), Canterbury (1933), Killingworth (1933), Madison (1933), and Voluntown (1933).

CLADONIA CLAVULIFERA f. SUBVESTITA Robbins (p. 447; Notes, p. 156). Guilford (1932, det. Sandstede), Killingworth (1933), and Madison (1933).

CLADONIA SUBCARIOSIA Nyl. (p. 449). Hamden (*Mrs. Hobbs & Mrs. Black*, 1933) and Suffield (*Smith*, 1933), both specimens without podetia.

CLADONIA SUBCARIOSIA f. EVOLUTA Vainio (p. 450; Notes, p. 156). Avon (1933), Canton (1933), Durham (1932), Franklin (1932), Hebron (1933), Killingworth (1933), Lebanon (1932), Middlefield (1932), Pomfret (*Mrs. Painc*, 1933), Portland (1933). Simsbury (1933), Wethersfield (*Clark*, 1933), and Wolcott (1933).

CLADONIA SUBCARIOSIA f. PLEUROCARPA Robbins (p. 451). Durham (1932).

CLADONIA SUBCARIOSIA f. SQUAMULOSA Robbins (p. 451; Notes, p. 156). Durham (1932) and Guilford (1932).

CLADONIA BREVIS Sandst. (Notes, p. 156). Avon (1933), Burlington (1933), and Madison (1933).

Subgroup MACROPUS

CLADONIA ALPICOLA (Flot.) Vainio (p. 452). The var. *karelica* Vainio of this species was listed on p. 452, on the basis of two speci-

mens. It was shown in the Notes, however, that one of these specimens represented *C. strepsilis* f. *glabrata*, whereas the other represented *C. brevis*. It was further shown that several other North American specimens, which had been determined as var. *karclica*, were likewise referable to *C. brevis*. It is now possible to record from Connecticut another *Cladonia* which authors include under *C. alpicola*, although it is not altogether certain that it belongs there. The *Cladonia* in question is the following:

*CLADONIA ALPICOLA f. MINOR (Vainio) Kovář, Věstník Klubu přírod. Prostějově 15: 154. 1912. *Cladonia alpicola* α. *foliosa* f. *minor* Vainio, Acta Soc. F. et Fl. Fennica 10: 64. 1894. On earth. Griswold (1933, ver. Sandstede) and Killingworth (Hall, 1874, det. Sandstede, listed on p. 449 as *C. cariosa* f. *squamulosa*).

Although Vainio considered the present plant an inconstant form of var. *foliosa* (Sommerf.) Vainio, the Connecticut specimens differ from the usual forms of this variety in several respects. The podetia, for example, instead of being 1–6 cm. in height, are only 3–6 mm. in height; and the podetial surface, instead of being squamulose, is nearly or entirely free from squamules. The podetia, in the majority of cases, are cylindrical, unbranched, and tipped with dark brown apothecia, which are more or less peltate. The cortex shows definite areolae, which are either close together or somewhat separated from one another, thus exposing the translucent medulla.

Since the podetia of f. *minor* are apparently destitute of spermatogonia, there is a possibility that the plant should be associated with members of the subgroup *Helopodium*. There are, in fact, two species of this group which f. *minor* resembles morphologically and with which it further agrees in being negative with KOH. These species are *C. clavulifera* and *C. brevis*. In *C. clavulifera*, however, the podetial cortex is continuous or subcontinuous throughout, and in *C. brevis*, which is a slightly larger plant, the podetia increase in diameter upward. Unfortunately the position of the spermatogonia in f. *minor* has not yet been satisfactorily demonstrated, so that its place in the system must remain in doubt.

Group THALLOSTELIDES

CLADONIA GRACILIS (L.) Willd. var. DILATATA (Hoffm.) Vainio (p. 457). Canton (1933).

CLADONIA VERTICILLATA (Hoffm.) Schaer. (p. 458). Hamden (Eaton, 1866, not previously reported) and Windsor (1933); both specimens are young.

CLADONIA VERTICILLATA f. EVOLUTA (Th. Fr.) Stein (p. 459; Notes, p. 159). Burlington (1933), Canton (1933), Durham (1932), Griswold (1933), Harwinton (1933), Lebanon (1932), Meriden (1933), Pomfret (*Mrs. Paine*, 1933), Simsbury (1933), and West Hartford (*Clark*, 1932).

*CLADONIA VERTICILLATA f. AGGREGATA (Del.) Oliv. Fl. Lich. de l'Orne 52. 1882. *C. cervicornis* var. *verticillata* f. *aggregata* (Del.) Malbr. Suppl. Lich. Normandie 11. 1881. *C. verticillata* var. *evoluta* f. *aggregata* Zahlbr. Cat. Lich. Univ. 4: 626. 1927. On shaded earth. Durham (1932) and Watertown (1933).

The proliferations from the upper surface of the cups, instead of being single, as in f. *evoluta*, are numerous and closely packed together.

CLADONIA VERTICILLATA f. APOTICTA (Ach.) Vainio (p. 460; Notes, p. 159). Burlington (1933) and Harwinton (1933).

CLADONIA VERTICILLATA f. PHYLLOCEPHALA (Flot.) Oliv. (p. 461). Canton (1933).

CLADONIA MATEOCYATHA Robbins (p. 461). Monroe (1933) and Pomfret (*Mrs. Paine*, 1933); the specimens show the thallus only.

CLADONIA MATEOCYATHA f. LEIOSCYPHA Evans (p. 462; Notes, p. 159). Avon (1933), Griswold (1933), and Meriden (1933).

CLADONIA MATEOCYATHA f. SQUAMULATA Robbins (p. 462; Notes, p. 159). Avon (1933), Meriden (1933), Monroe (1933), and Windsor (1933).

CLADONIA PYXIDATA (L.) Hoffm. var. NEGLECTA (Floerke) Mass. f. SIMPLEX (Ach.) Harm. (p. 464; Notes, p. 159). Bristol (1933), Durham (1932, det. Sandstede), East Haddam (1933), Hamden (*Mrs. Hobbs & Mrs. Black*, 1933), Harwinton (1933), Hebron (1933), Killingworth (*Hall*, 1875, det. Sandstede, not previously reported), Madison (1933), Marlboro (1933), Meriden (1933), New Haven (*Nichols*, 1909, not previously reported), Simsbury (1933), and Stafford (1932, det. Sandstede). The three specimens determined by Sandstede were referred simply to var. *neglecta*. The records for Killingworth and New Haven antedate those given on p. 464.

CLADONIA PYXIDATA var. NEGLECTA f. LOPHYRA (Ach.) Koerb. Hamden (*Mrs. Hobbs & Mrs. Black*, 1933).

*CLADONIA PYXIDATA var. POCILLUM (Ach.) Flot. f. CAESIOCINEREA Bouly de Lesdain, Bull. Soc. Bot. France 68: 16. 1921. On rocks, Milford (1927, det. Sandstede, not previously reported). New to North America. The Milford specimens of var. POCILLUM, listed on p. 159 of the Notes, approach f. *caesiocinerea*.

According to the description of Sandstede¹ the primary squamules of f. *caesiocinerea*, which are characterized by their ashy to bluish color, unite to form rosettes with a diameter of about 4 cm. In the middle of the rosette they are relatively small and imbricated; to-

¹ In Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 408. 1931.

ward the periphery they are larger and appressed to the substratum. The podetia are sparingly produced.

*CLADONIA MAGYARICA Vainio var. *POCILLIFORMIS* Vainio in Anders, Arch. Protistenk. **71**: 501. *pl. 21, f. 1.* 1930. On earth. East Haddam (Clark, 1932, det. Sandstede). New to the United States.

The species, as well as the var. *pocilliformis*, was based on Hungarian material. Sandstede,¹ however, records the variety, not only from Hungary, but also from Sweden, Switzerland, Algeria, Istria, Macedonia, and the West Indian republic of Haiti.

This interesting species is a close relative of *C. pyxidata* but is distinguished by giving a distinct yellow reaction with KOH. Sandstede notes that var. *pocilliformis* agrees with *C. pyxidata* var. *pocillum* in forming definite rosette-like clusters. The squamules in the middle of these clusters are appressed and brownish, whereas those at the periphery are ascending and grayish green. The podetia, which lack soredia, are more slender than those of var. *pocillum*, and the cups are less expanded.

CLADONIA CHLOROPHAEA (Floerke) Spreng. (p. 465; Notes, p. 139). Avon (1933), Barkhamsted (1933), Bridgewater (1928), Burlington (1933), Canterbury (1933), Canton (1933), Cheshire (1932), Colchester (1932), East Haddam (1933), Goshen (1927, not previously reported), Hamden (Mrs. Black & Mrs. Hobbs, 1933), Hartland (1933), Killingworth (1932, 1933), Lebanon (1932), Litchfield (1933), Madison (1932), Middlefield (1932), Portland (1933), Shelton (1928, listed in Report as f. *simplex*), Voluntown (1933), West Hartford (Clark, 1932), and Wolcott (1933). The determinations upon which these records are based were made or verified by Sandstede.

CLADONIA CHLOROPHAEA f. *COSTATA* (Floerke) Arn. (p. 469). Hamden (Mrs. Hobbs, 1932, det. Sandstede).

*CLADONIA CHLOROPHAEA f. *PSEUDOTRACHYNA* (Harm.) Sandst. Abhandl. Naturw. Ver. Bremen **25**: 221. 1922. *C. pyxidata* var. *chlorophaea* f. *pseudotrachyna* Harm. Lich. France **3**: 305. 1907. On earth in woods, Burlington (1933, det. Sandstede). Not previously reported from North America.

The podetia of f. *pseudotrachyna* are once or twice proliferous, but the ultimate proliferations are not distinctly scyphiferous. They are rather in the form of cylindrical or flattened outgrowths, in most cases tipped with apothecia. The podetial surface is granular or verruculose, except in the sorediose areas, which become decorticate and whitish. The podetia are further distinguished by being more or less furrowed or lacerate. Sandstede gives an excellent figure

¹ In Rabenhorst, Kryptogamen-Flora **9**, Abt. 4²: 411. 1931.

of *f. pseudotrachyna*,¹ which he compares with *f. costata*, a more delicate and slender plant. The figure shows podetial squamules in some abundance, and these are present also in the North American specimens.

CLADONIA CHLOROPHAEA *f. PTERYGOTA* (Floerke) Vainio (p. 470). Hamden (*Mrs. Black*, 1933) and Shelton (1928, previously reported simply as *C. chlorophaea*). The determinations were made by Sandstede.

*CLADONIA CHLOROPHAEA *f. INTERMEDIA* Sandst. in Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 422. *pl. 29, f. 8.* 1931. On earth. Canton (1933) and Guilford (1928, listed on p. 468 as *C. chlorophaea f. simplex*). The determinations were made by Sandstede. Not previously reported from North America.

Under the above name Sandstede distinguishes a form of *C. chlorophaea* in which the cups are typically simple and more or less toothed along the margin. The teeth in some cases are tipped with spermatophoria but many of the podetia are completely sterile. The podetial cortex, which is persistent to above the middle, is smooth at the very base but forms crowded or scattered verruculae throughout the greater part of its extent. Toward the margins of the cups the surface is sorediose and soon becomes decorticate and whitish.

CLADONIA CHLOROPHAEA *f. LEPIDOPHORA* (Floerke) Sandst. (p. 471). Colchester (1932) and Hamden (*Mrs. Hobbs*, 1933), both determined by Sandstede.

CLADONIA CHLOROPHAEA *var. PACHYPHYLLINA* (Wallr.) Vainio (p. 472; Notes, p. 159). Durham (1932, det. Sandstede, as *f. pachyphyllina*).

CLADONIA GRAYI Merrill (Notes, p. 159). Berlin (1927), Bethany (1925, 1927), Branford (1928, 1932), Bridgewater (1928), Bristol (1933), Burlington (1933), Canterbury (1933), Canton (1933), Cheshire (1932), Cornwall (1928), Darien (1926), Durham (1928), East Haddam (*Clark*, 1932), East Hampton (1928, 1932), East Haven (*Miss Meyrowitz*, 1922), Essex (1927), Glastonbury (*Miss Sudbury*, 1927, not previously reported), Griswold (1933), Guilford (1925, listed in the Catalogue² as *C. pyxidata* intermediate between vars. *chlorophaea* and *neglecta*; 1928; 1932; *Miss Fulford*, 1932), Hamden (*Mrs. Black*, 1933), Killingworth (*Hall*, 1874, not previously reported; 1932; 1933), Litchfield (1927, 1933), Madison (1927; 1931, listed in the Notes as from Killingworth, not new to town), Meriden (*Musch & Nichols*, 1926), Middlefield (1932), Monroe (1933), Norfolk (*Nichols*, 1912), North Branford (*Musch & Evans*, 1927; *Evans*, 1927, not new to town), North Haven (1927), Plainville (*Wright*, 1883), Portland

¹ In Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: *pl. 29, f. 3.* 1931.

² Evans & Meyrowitz, Catalogue of the Lichens of Connecticut. Connecticut Geol. and Nat. Hist. Survey. Bull. 37. 1927.

(1933), Salisbury (1932), Seymour (1928, not previously reported), Shelton (1928), Simsbury (1933), Southington (1932), Stamford (Marshall, 1928; Evans, 1928), Stratford (1933), Union (1927), Willington (1932), Windsor (1928), and Wolcott (1933). The determinations were all made by Sandstede; unless otherwise indicated, stations dated 1928 or earlier are listed in the writer's report under *C. chlorophaea* or one of its forms.

*CLADONIA GRAYI f. CYATHIFORMIS Sandst. in Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 429. 1931. On banks. Meriden (1927, listed on p. 471 as *C. chlorophaea* f. *carpophora*) and Prospect (1928, listed on p. 469 as *C. chlorophaea* f. *simplex*), both determined by Sandstede. Not before recorded from North America.

According to Sandstede the primary squamules of f. *cyathiformis* are firmer than those of the ordinary forms of the species, and the podetia, which are for the most part sterile, are shorter and usually form broad and shallow cups.

CLADONIA CONISTA (Ach.) Robbins f. SIMPLEX Robbins (p. 473; Notes, p. 160). Burlington (1933), Canton (1933), Durham (1932), Harwinton (1933), Killingworth (1933), Lebanon (1932), Marlboro (1933), and Thomaston (1933).

Several of these specimens have been determined as *C. fimbriata* f. *conista* by Dr. Sandstede. He has kindly pointed out in a letter that this form is perhaps understood in too broad a sense, so that it includes, not only the plant originally distinguished by Acharius, but also the plant described by Harmand under the name *C. pyxidata* var. *chlorophaea* f. *conistea* Del.¹ Dr. Sandstede refers to the latter form, with some question, three of the specimens listed above. The writer, however, is not yet able to distinguish clearly between f. *conistea* and what Robbins called *C. conista* and therefore lists these questionable specimens, at least provisionally, under the latter species.

CLADONIA FIMBRIATA (L.) Fr. (p. 473; Notes, p. 160). Burlington (1933), Colebrook (Nichols, 1912, det. Sandstede, listed on p. 468 as *C. chlorophaea* f. *simplex*), East Haddam (1933), Guilford (Miss Fulford, 1932, det. Sandstede, thallus only), Lebanon (1933, det. Sandstede), Litchfield (1933), Madison (1933, det. Sandstede, thallus only), and Simsbury (1933, det. Sandstede).

The records for *C. fimbriata*, which are given on p. 474 of the writer's Report, were all based on specimens of *C. major* and are listed below under that species. There is doubt also about the systematic position of the specimens listed under f. *stenoscypha* Evans on p. 475. According to Sandstede's definition of *C. fimbriata* the podetia are always cup-forming. Since the podetia of f. *stenoscypha*

¹ Lich. France 3: 304. 1907.

may be either cup-forming or subulate, the form does not agree with this definition. In fact Sandstede, in a letter, transfers it to *C. coniocraea* and suggests its identity with *C. fimbriata* var. *apolepta* f. *stenocephala* Stuckenbergl¹ which was based on Russian specimens. It is to be hoped that he may throw further light on these critical plants in his published writings.

*CLADONIA FIMBRIATA f. EXILIS (Hoffm.) Crombie, Jour. Linn. Soc. Bot. 17: 558. 1880. *C. pyxidata* **C. exilis* Hoffm. Deutschl. Fl. 2: 121. 1796. *C. fimbriata* var. *simplex* f. *exilis* Zahlbr. Cat. Lich. Univ. 4: 508. 1927. On a sandy bank, North Haven (1931, det. Sandstede, not previously reported). New to North America.

The slender podetia of f. *exilis* are only 0.5–1 mm. in diameter and, in most cases, less than 1 cm. in height. They are delicate in texture and may be more or less constricted below the narrow cups. Sandstede² gives an excellent illustration of the form and expresses the opinion that it may sometimes represent a juvenile stage of development.

*CLADONIA MAJOR (Hag.) Sandst. Abhandl. Naturw. Ver. Bremen 25: 223. 1922. *Lichen pyxidatus* β. *major* Hag. Tent. Hist. Lich. 113. 1782. *Cladonia fimbriata* var. *simplex* f. *major* Vainio, Acta Soc. F. et Fl. Fennica 10: 258. 1894 (as α. *simplex* α. *major*); Zahlbruckner, Cat. Lich. Univ. 4: 509. 1927 (as var. *simplex* f. *major*). On earth. Ashford (Clark, 1933), Barkhamsted (1933), Burlington (1933), Goshen (Miss Sudbury, 1927), Killingworth (1932, 1933), New Haven (Nichols, 1912), and North Canaan (1928). The specimens from Ashford and Burlington were determined by the writer, the others by Sandstede.

The writer (p. 474) has already called attention to the chemical differences between *C. fimbriata* and *C. major*. From a morphological standpoint the two species are much alike and both produce relatively slender podetia, which broaden out gradually into distinct cups. In some cases the cups expand more abruptly in the upper part, so that the mouth flares more or less, but in most of the podetia the mouth remains relatively narrow. Both species produce farinose soredia in abundance, and the mature podetia are destitute of a cortex except perhaps at the base. The most obvious differences between *C. fimbriata* and *C. major* are differences in size. According to Sandstede's data the podetia in the usual forms of *C. fimbriata* are 1–2 mm. in diameter and up to 20 mm. in height; in *C. major*, on

¹ Recherches sur les Cladonies des gouv. de Penza et de Saratow 60. pl. 3, f. 8. 1917.

² In Rabenhorst, Kryptogamen-Flora 9, Abt. 4: 432. pl. 30, f. 6. 1931.

the contrary, they may be as much as 3 mm. in diameter and up to 40 mm. in height; the cups, in fact, may expand to a diameter of as much as 12 mm. at the mouth. The podetia of *C. major*, although normally simple, proliferate more frequently than those of *C. fimbriata*; and the cortex lining the inside of the cups, although ultimately broken up into soredia, persists longer than in *C. fimbriata*. In *C. major*, moreover, the corticate area at the base of the podetia tends to be fairly extensive and may reach to above the middle; in *C. fimbriata* the corticate area, if present at all, is restricted to the base.

CLADONIA NEMOXyna (Ach.) Nyl. (p. 475; Notes, p. 160). Barkhamsted (1933), Canton (1933), Durham (1932), Griswold (1933), Harwinton (1933), Marlboro (1933), Portland (1933), Suffield (Smith, 1933), Thomaston (1933), Watertown (1933), West Hartford (Clark, 1932), and Wethersfield (Clark, 1933).

CLADONIA NEMOXyna f. FIBULA (Ach.) Vainio (p. 477; Notes, p. 160). Durham (1932), Griswold (1933), Voluntown (1933), and Wethersfield (Clark, 1933).

CLADONIA CONIOCRAEA (Floerke) Spreng. f. CERATODES (Floerke) Dalla Torre & Sarnth. (p. 479; Notes, p. 160). Ashford (Clark, 1933), Burlington (1933), Canton (1933), Coventry (Clark, 1933), East Haddam (Clark, 1933), Glastonbury (Miss Sudbury, 1927, not previously reported), Guilford (Clark, 1933), Harwinton (1933), Killingworth (1933), Litchfield (1933), Middletown (1932), Simsbury (1933), Stafford (1932), Suffield (Smith, 1933), Voluntown (1933), West Hartford (Clark, 1932), and Wolcott (1933).

CLADONIA CONIOCRAEA f. TRUNCATA (Floerke) Dalla Torre & Sarnth. (p. 480; Notes, p. 160). Ashford (Clark, 1933), Bethany (M. Fulford, 1932), Canton (1933, in part det. Sandstede), East Haddam (1933), Harwinton (1933), Litchfield (1933), Middletown (1932), Portland (1933), Salisbury (1932), Stafford (1932), Voluntown (1933), and West Hartford (Clark, 1932).

CLADONIA CONIOCRAEA f. EXPANSA (Floerke) Sandst. (Notes, p. 160). Madison (1931, listed in the Notes as from Killingworth).

CLADONIA CONIOCRAEA f. ROBUSTIOR (Harm.) Sandst. (Notes, p. 161). Durham (1932), Guilford (1933), and Salisbury (1932, det. Sandstede).

CLADONIA CONIOCRAEA f. PYCNOTHELIZA (Nyl.) Vainio (Notes, p. 161). Killingworth (1933).

*CLADONIA OCHROCHLORA Floerke, Clad. Comm. 75. 1828. *C. fimbriata* var. *ochrochlora* Vainio, Acta Soc. F. et Fl. Fennica 10: 319. 1894 (as *C. fimbriata* ð. *ochrochlora*); Zahlbruckner, Cat. Lich. Univ. 4: 502. 1927 (as variety). On earth and rotten wood. North Haven (1931, det. Sandstede, not previously reported), Salisbury (1932), and Voluntown (1933).

The relationship between *C. ochrochlora* and *C. coniocraea* is very

close, and it is only recently that they have been specifically distinguished. Even at the present time they are still regarded by certain authors as varieties of *C. fimbriata*. The species agree with each other in many of the characters drawn from the podetia. In both species, for example, these may be either narrowly cup-forming or subulate and always produce an abundance of farinose soredia. In *C. coniocraea*, however, the sorediose area is more extensive than in *C. ochrochlora*. It involves not only most of the external surface but also the inner surface of the cups. The corticate areas, in fact, if present at all, are restricted to the basal portion and to the region just below the apothecia. In *C. ochrochlora*, on the other hand, the inner surface of the cups is corticate, the basal and subapical corticate areas are larger, and corticate patches may be scattered about in the sorediose regions.

CLADONIA BORBONICA (Del.) Nyl. f. CYLINDRICA Evans (p. 482; Notes, p. 161). Burlington (1933), Canton (1933), Cheshire (1932), East Haddam (Clark, 1932; Evans, 1933), Guilford (1933), Killingworth (1932), Litchfield (1933), Meriden (1933), Middlebury (Musch & Evans, 1929, not previously reported), Middletown (1932), Portland (1933), Simsbury (1933), Stafford (1932), Voluntown (1933), and Watertown (1933).

CLADONIA BORBONICA f. SQUAMULOSA Robbins (p. 482; Notes, p. 161). Cheshire (1932), East Haddam (1933), and Watertown, (1933).

CLADONIA PITYREA (Floerke) Fr. var. ZWACKHII Vainio f. SUBACUTA Vainio (p. 485; Notes, p. 162). Canton (1933), Coventry (Clark, 1933), Durham (1932), East Haddam (1933), Franklin (1932), Hamden (Mrs. Black & Mrs. Hobbs, 1933), Harwinton (1933), Killingworth (1933), Portland (1933), Stafford (1932), Voluntown (1933), and Watertown (1933).

CLADONIA PITYREA var. ZWACKHII f. SQUAMULIFERA Vainio (p. 485; Notes, p. 162). Colchester (1932) and East Haddam (1933).

Group FOLIOLAE

CLADONIA STREPSILIS (Ach.) Vainio (p. 487; Notes, p. 162). Burlington (1933), Canton (1933), Franklin (1932), Guilford (1932), Hamden (Mrs. Black, 1933), Hebron (1933), Middletown (1932), and Portland (1932). Most of these records are based on sterile specimens.

CLADONIA STREPSILIS f. GLABRATA Vainio (p. 488; Notes, p. 163). Avon (1933), Canton (1933), Cheshire (1932), Franklin (1932), Griswold (1933), Killingworth (1932), Meriden (1933), and Pomfret (Mrs. Paine, 1933).

CLADONIA STREPSILIS f. CORALLOIDEA (Ach.) Vainio (p. 489; Notes, p. 163). Avon (1933), Canton (1933), Cheshire (1932), Griswold (1933), Killingworth (1932), Wallingford (1932), and Willington (1932).

CLADONIA STREPSILIS f. SUBSESSILIS Vainio (p. 489). Wallingford (1932).

CLADONIA STREPSILIS f. MEGAPHYLLINA Harm. (Notes, p. 163). Branford (1932), Guilford (1932), and Milford (1932).

Group OCHROLEUCAE

CLADONIA PIEDMONTENSIS Merrill f. OBCONICA Robbins (p. 491; Notes, p. 163). East Haddam (1933), Madison (1933), and Voluntown (1933).

CLADONIA PIEDMONTENSIS f. SQUAMULOSA Robbins (p. 491; Notes, p. 163). Durham (1932), East Haddam (1933), Madison (1933), Milford (1932), and Voluntown (1933).

CLADONIA PIEDMONTENSIS f. SQUAMOSISSIMA Robbins (Notes, p. 164). Madison (1933).

Cladonia piedmontensis f. *lepidifera* (Vainio) Robbins (p. 491; Notes, p. 164). Durham (1932), Milford (1932), Pomfret (Mrs. Paine, 1933), and Wolcott (1933).

*CLADONIA PIEDMONTENSIS Merrill f. EPIPHYLLA Robbins, RHODORA 31: 104. 1929. On earth in an old field, Milford (1932).

The apothecia in f. *epiphylla* are not borne on distinct podetia but are either sessile or short-stipitate on the primary squamules, arising from the upper surface or from the margin. The form is a homologue of the epiphyllous forms found in *C. clavulifera*, *C. subcariosa*, and other species.

At the close of 1931 (see Notes, p. 164) collections of Cladoniae had been made in 99 of the towns of Connecticut. During the years 1932 and 1933 collections were made in 20 additional towns, thus increasing the total number to 119 and reducing the number of towns still to be heard from to 50. It is hoped that this number may be still further decreased.

At the close of 1931 the number of towns to each of which 16 or more species of Cladonia had been accredited totaled 23. This number has now been increased to 39. The town standing at the head of the list is Madison, in which 37 species have been collected. This is closely followed by Killingworth, with 35 species to its credit, and North Branford, with 34. The other towns, each with 25 or more species, are the following: Old Saybrook, with 32; East Hampton and North Haven, with 28 each; Canton and North Canaan, with 27 each; and Wallingford, with 26. It will be remembered that North Canaan headed the list at the close of 1928 and North Branford at the close of 1931.

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UVULARIA PERFOLIATA IN LOUISIANA.—In a recent study of the genus *Uvularia* (Anderson and Whittaker, in *Journal of Arnold Arboretum*, 15: 28-42. 1934) the junior author of this note came across a record of *Uvularia perfoliata* in northern Louisiana. Since this was over five hundred miles beyond the western limit of its previously known range, it was thought worth while to examine the specimen critically to verify the determination. The specimen, which was kindly lent us for study by Dr. J. M. Greenman, curator of the herbarium of the Missouri Botanical Garden, where it was deposited, was collected at Natchitoches, La., *E. J. Palmer*, no. 7399, April 24, 1915. The plant has immature fruit.



Range of *UVULARIA PERFOLIATA* (circles) and of *UVULARIA GRANDIFLORA* (solid dots). X indicates westward extension of range of former species.

Although differing in slight details from specimens collected in the east, there can be no doubt that it belongs to this species, and it can scarcely be considered as even varietally distinct. There are four leaves below the fertile branch, which although unusual, is not unknown. The plants are also slightly shorter than in most collections from the northern and eastern states, although a few others collected along the border of the range show a similar tendency.

The region about Natchitoches is one of low hills dissected by creeks and bayous. The *Uvularia* was growing on a slope in upland woods in sandy soil enriched with humus, and in association with such other plants of rather northern range as *Erythronium americanum*, *Claytonia virginica*, *Dentaria laciniata*, *Cardamine pennsylvanica* and *Viola papilionacea*.

It is interesting to note that although this record extends the range of the species so much farther west and beyond the Mississippi River, it is still found within the same belt, between the piedmont and the low coastal plain, which it mainly follows around the eastern and southern sides of the continent, although extending somewhat further inland along the Great Lakes.—ERNEST J. PALMER and EDGAR ANDERSON, Arnold Arboretum.

A MUTATION IN *RUBUS PARVIFLORUS*¹

FREDERICK J. HERMANN

Plate 326

OF THE three thornless, simple-leaved species of *Rubus* in eastern North America, the two shrubby species, *Rubus odoratus* L. and *R. parviflorus* Nutt. (§ *Anoplobatus* Focke, accorded generic status by Necker² as *Bosseckia* and by Rydberg³ as *Rubacer*) occur in Michigan. Beal's statement⁴ of the distribution of the former species in the State is somewhat ambiguous. He refers to it as occurring throughout Michigan ("so far as known"), states that it is known from Ft. Gratiot (St. Clair Co.) northward, is common in the Upper Peninsula and in the Lower Peninsula north of Houghton Lake but that it has not been observed in the region south of this lake. It is represented

¹ Papers from the Department of Botany and Herbarium of the University of Michigan, no. 463.

² Necker; *Elem.* 2:91. 1790.

³ Rydberg, *Bull. Torr. Bot. Club* 30:274. 1903.

⁴ Beal, *Michighn Flora*, 87 (1904).

in the University of Michigan Herbarium from St. Clair, Osceola and Presque Isle Counties. If it occurs as far north as Houghton and Keweenaw Counties it must be a rarity there since the writer during several years of botanizing in these counties has never detected it. It is primarily an eastern species ranging from Nova Scotia to Georgia and apparently reaching in Michigan the western limit of its range.

The eastern limit of the range of its nearest relative, *Rubus parviflorus*, coincides approximately with the western limit of *R. odoratus*. It occurs sparingly in western Ontario, becomes more common northward and westward through Michigan and Minnesota, and is a plentiful species from the Rockies to the Pacific coast. Beal gives Elk Rapids (Grand Traverse Co.) as its southermost station in Michigan and states that it is frequent at Petoskey (Emmet Co.) and common farther north. In the University of Michigan Herbarium it is represented from Presque Isle, Emmet, Mackinac, Menominee, Marquette, Baraga, Ontonogon, Houghton and Keweenaw Counties. In Houghton and Keweenaw Counties it is a familiar sight. Indeed, one seldom enters a grove there where the characteristic fragrance of its glandular stems may not be detected. Here it is known as "Thimbleberry," and its delicious fruit, the most prized of the native "berries" belies the derogatory terms of the manuals ("insipid," "scarcely edible,") so indiscriminately applied to it throughout its range. The disparaging adjectives are appropriate only for the fruit of the plant in the West (the "salmon berry") which rarely has sufficient moisture to develop more than a cluster of dry drupes.

These two plants, with the western *R. deliciosus* James and *R. Chamæmorus* L., are markedly in contrast with their North American congeners in being hemicryptophytes and in normally lacking the compound leaves so characteristic of the other species of the genus. The writer has been familiar for many years with *R. parviflorus* in the two northernmost counties of Michigan, where it is a dominant under-shrub in vast stretches of coniferous and hardwood forest, and in the aspen and spruce zones of the Rocky Mountains, the Cascades and Sierra Nevadas. Its large, simple, five-lobed or -angled leaves display so little variation in outline that it was a decided surprise to come upon a plant, amid a large colony of the typical plant, near Agate Harbor, Keweenaw Co., Michigan, which possessed only palmately-compound leaves with the leaflets deeply lobed and incised. In all other vegetative characters the plant resembled the typical form. It was not in flower or fruit. Since the occurrence of such sporadic

mutations seems to be frequently induced by some injury to the plant,¹ the compound-leaved *Rubus* was carefully examined for evidence of injury but none, superficial at least, could be detected. An intensive search through a large part of the colony failed to reveal any further mutations.

This very distinctive form of the "thimbleberry" may be known as

RUBUS PARVIFLORUS Nutt., forma **pedatifidus**, forma nov. (PL. 0, 326, FIG. 2) laminis foliorum palmato-compositis, segmentis valde lobatis incisisque.—MICHIGAN: edge of abandoned road in spruce woods near Silver Isle, west of Agate Harbor, Keweenaw County, August 26, 1928, *F. J. Hermann*, no. 2188 (TYPE in Herbarium of the University of Michigan).

UNIVERSITY OF MICHIGAN.

EXPLANATION OF PLATE 326

FIG. 1. *RUBUS PARVIFLORUS* Nutt. Typical form (*F. J. Hermann*, no. 2187) from the same locality as the plant of fig. 2. FIG. 2. *RUBUS PARVIFLORUS* Nutt., f. **PEDATIFIDUS**, forma nov. (TYPE, *F. J. Hermann*, no. 2188).

A NEW SPECIES OF *NEUROLAENA* FROM BRITISH HONDURAS

B. L. ROBINSON

THE small tropical American genus *Neurolaena*, belonging in the *Senecio* tribe of the *Compositae*, may within this group be pretty readily distinguished by its 3-5-seriate involucre, homogamous heads and chaffy receptacle. The species at first appear to be, and often in fact are reported as, herbaceous plants, but they frequently attain considerable height (3-6 m.) and the stems become at least softly woody toward the base. They are often rather stately plants with conspicuous corymbs of golden yellow or greenish yellow flowers.

The late Dr. Rydberg, when treating *Neurolaena* for the North American Flora, recognized five species. One of these, namely *N. lobata* (L.) R. Br., is of rather wide tropical dispersal, occurring from southern Mexico and many of the West Indian Islands to Dutch Guiana and southward to Peru. It seems to be rather common and is often included in the gatherings of collectors making their first journeys to tropical America. Notwithstanding its yellow flowers and chaffy disk it is frequently taken for a *Eupatorium*. Indeed, it

¹ Cf., for example, Fernald & Harris on *Polygonatum pubescens*, forma *fulvius*, *RHODORA* 35: 405. 1933.

was twice so described by Dr. F. W. Klatt, first as *E. Valeridianum* and later as *E. chrysocephalum*, the latter being a name omitted by Dr. Rydberg from his otherwise excellent synonymy.

The other species of *Neurolaena*, as recognized by Rydberg, are all very local plants of southeastern Mexico and Guatemala, three of them being known as yet from single stations only. To this group of highly localized species there may now be added another, from British Honduras, which may be put on record, as follows:

NEUROLAENA Schippii, spec. nov., fruticosa robusta usque ad 2.7 m. alta dense sordideque puberula post exsiccationem atro-olivacea; caule valde angulato albo-medullosa ad basin versus ca. 4 cm. crasso; foliis alternis breviter petiolatis oblongo-lanceolatis acuminatis cuspidato-denticulatis, ad basin versus attenuatis, penniveniis, supra scabrido-hirtellis, subtus reticulato-venulosis molliter sordideque pilosulis; foliis inferioribus, ut dicitur, magnis usque ad 4.5 dm. longis et 2.2 dm. latis; superioribus (solis ab auctore visis) minoribus pro portione angustioribus (saepe quadrifariam longioribus quam latis); petiolo gracili ca. 1 cm. longo; panicula corymbosa composita alterniramea convexa 2.5 dm. diametro; bracteis parvis filiformi-linearibus; pedicellis plerisque 2-3 cm. longis; capitulis numerosis, pro genere magnis et multifloresculosis 1.3 cm. altis 1.5-2 cm. diametro; involucri squamis 4(-5)-seriatim imbricatis et regulariter gradatis, extimis brevibus lanceolatis acuminatis herbaceis dorso griseo-puberulis, intermediis ovato-lanceolatis vel ovatis acutis vel acutiusculis subherbaceis post exsiccationem fusco-olivaceis dorso subglabris striatis margine pallidioribus, intimis oblongis vel oblongo-linearibus abrupte acutatis vel saltem ad apicem versus angustatis flavescentibus; paleis disci linearibus ca. 1 cm. longis ad apicem triangularem primo incurvis; corollis graciliter tubulatis sine faucibus distinctis, dentibus limbi ca. 0.6 mm. longis; achaeniis (immaturis) 1 mm. longis; pappi setis ca. 65 tenuiter capillaribus brunnescenti-albis 7 mm. longis.—BRITISH HONDURAS: forest shade, Camp 32 of British Honduras-Guatemala Survey, alt. about 730 m., March 26, 1934, *Schipp*, no. S-735 (TYPE, in Gray Herbarium). Said to be very rare even at the single station where obtained.

It is a pleasure to name this interesting novelty for its discoverer, Mr. William A. Schipp, who by diligent exploration and copious collections has done much to further knowledge of the vegetation to be found in the picturesque but rarely visited land where for some years he has been situated.

N. Schippii appears to be most closely related to *N. macrocephala* Sch.-Bip. of Vera Cruz, but that has quite a different involucre, in which there is a rather sudden transition from the few outermost phyllaries of calyculate nature to the very broad obtuse, round-tipped

or even subtruncate intermediate and inner ones, while as already indicated the transition in *N. Schippii* is regularly graduated and the inner phyllaries either somewhat pointed or at least perceptibly narrowed at the tip. From the other species of the genus, *N. Schippii* should be readily distinguished by its large and very numerous flowered heads.

GRAY HERBARIUM.

EVOLVULUS PILOSUS AN INVALID NAME.—In the latest monograph of the genus *Evolvulus* by Mr. S. J. van Ooststroom, the name *E. pilosus* Nutt. is brought forward for the species hitherto known as *E. argenteus* Pursh. The latter name, according to the International Rules as adopted by the Botanical Congress in Cambridge is invalidated by the earlier *E. argenteus* R. Br.; but, is not *E. pilosus* Nutt. also invalid? The name was first published by Nuttall, Gen. N. Am. Pl. i. 174 (1818), in synonymy, and later, Trans. Amer. Phil. Soc. v. 195 (1837), as a valid name. Unfortunately, at that time *E. pilosus* was already pre-empted by Roxburgh, Fl. Ind. ii. 106 (1832). In view of this, it appears that the valid name for the species in question is *E. Nuttallianus* Schultes, Syst. Veg. vi. 198 (1820).

I am indebted to Mr. C. A. Weatherby for checking this matter with me.—LILY M. PERRY, Sweet Briar College, Sweet Briar, Virginia.

SOME OBSERVATIONS ON THE FLORA OF THE BRUCE PENINSULA, ONTARIO

G. L. STEBBINS JR.

THE Bruce Peninsula, that narrow promontory of limestone separating Lake Huron from the southern part of Georgian Bay, has long been known for the wealth of its flora, and for a number of isolated species of western range found there. With these attractions in view, Mr. James Stauffer and the writer led a group of five Colgate students, J. R. Breed, H. Jeffrey, P. H. Jenkins, J. E. Loveless, and S. K. Phillips, on a field trip to this region, in order to become acquainted with its flora and to collect such of the rarer species as could be found.

On June 13, 1933 we made our first camp on Isaac Lake, in the settled farm lands of the interior of the peninsula. The borders of

this lake were lined with a fine blue flag with glaucous foliage, which looked different from the familiar *Iris versicolor*. This later proved to be the first find of the trip, *I. virginica*, here 175 miles northeast of its previously known range in Ontario.

The next day we went to Cape Croker, on the eastern side of the peninsula, for a day's collecting, which introduced us to many of the beauties of the region's flora, but yielded nothing not already known from, or to be expected from this region. After a day's rest, we moved to Red Bay, on the western shore. The marl bogs, gravelly shores, and open swales of this region, although already well known to botanists, gave us many thrills in the form of striking plants unfamiliar to us, and occupied us for the next week. Here we first noticed one of the most interesting features of the Bruce; plants characteristic of widely separated regions here grow side by side in the same habitat. The woods in the interior are Alleghenian in character, and not much different from those familiar to us in central New York. Beech and sugar maple, basswood and hop hornbeam are the cover for such herbs as *Hydrophyllum virginianum*, *Utricularia grandiflora*, and *Osmorhiza Claytoni*. Yet in the midst of this assemblage of familiar plants was the Cordilleran *Osmorhiza divaricata*, abundant, and just as much at home as its more southern relative. Between these woods and the shore is a more or less narrow belt of Canadian woodland, in which *Thuja occidentalis*, *Picea glauca*, *Betula papyrifera*, and *Populus tacamahacca* are dominant, along with such characteristic Canadian herbs as *Listera cordata*, *Habenaria obtusata*, and *Viola nephrophylla*, but containing also the Alleghenian *Senecio obovatus*, and the Cordilleran *Festuca occidentalis*, *Carex Richardsonii*, and *Corallorrhiza striata*. The shoreward side of these woods is interspersed with marl and sphagnum bogs, containing a large number of Hudsonian types, such as *Carex capillaris*, *Drosera linearis*, *Selaginella selaginoides*, and *Carex gynocrates*, but open swales, containing such species as *Cacalia tuberosa*, characteristic of wet prairies in the central states, are scattered through this same region. Likewise, along the shore itself, *Houstonia ciliolata*, characteristic of the upper Mississippi Valley, was at home with the boreal *Pinguicula vulgaris*, *Primula intercedens*, and *Carex scirpoides*.

On June 20 we made a trip northward, following the eastern side of the peninsula, through burned-over limestone barrens of a most desolate nature, as far as Gillie's Lake, north of the small village of Dyer's Bay. The country about the western end of this lake was as

unpromising as that which we had been passing through, but we were assured by campers who had chosen this secluded but rather inhospitable spot in which to spend their vacation that the other end, five miles away, was surrounded by fine woods. This we had to reach by another road, which became so bad that only half of the party considered it worth while following. Three of us, however, persisted to the end of the road, where we found good woods, as we had been promised, again filled with Alleghenian types common in central New York. The shores of the lake were as uninteresting at this end as at the other, but a walk of a few hundred yards brought us to the shore of Georgian Bay, edged with limestone cliffs which continue in almost unbroken sequence along the entire east side of the peninsula. Here, as in most places, they had been burned over and looked hopelessly dry, but, nevertheless, a few minutes search revealed enough to repay us for our trip. *Antennaria Farwellii*, previously known only from northern Michigan, was on the gravelly bank which we descended to reach the shore; *Asplenium cryptolepis*, the first station on the mainland of Ontario, on the boulders at the foot of the cliffs; while the ledges themselves were covered with *Draba lanceolata* and *Pellaea glabella*. Two of the clumps of *Pellaea* looked more luxuriant than the rest, hanging over an almost inaccessible ledge in a tantalizing manner. Resolved to get them, I climbed carefully to the ledge above, clung with one hand to a welcome cedar branch, and with the other was just able to reach the nearest of the two. This was fortunate enough, for it proved to be true *P. atropurpurea*, the first station in Ontario. This species, so characteristic of the southern Appalachians and the central Mississippi Valley, was on the same ledge with *Draba lanceolata*, here very near the southern limit of its range, affording another of the striking associations of boreal and southern types so characteristic of this peninsula.

On returning to Red Bay, we learned that Stauffer's group had found good hunting under a high, overhanging cliff which we had noticed on the trip up, about three or four miles north of Lion's Head. Here, in one of the few spots unspoiled by fire, they had also found *Pellaea atropurpurea* and *Draba lanceolata*, and in addition, a peculiar, dwarf *Epilobium* which was nowhere near anything in the manuals. This was later identified by Professor Fernald as *E. leptocarpum* Haussk. var. *Macounii* Trel., a species of Athabasca and the Canadian Northwest, known previously in eastern America only from Newfoundland.¹

¹ Fernald, M. L. RHODORA 28: 218. 1926

Our third stopping place was Barrow Bay, on the east side of the peninsula, where we vainly tried to find another spot along the cliffs which was not burnt over. For the most part, we could only guess at what rarities had existed on these cliffs before the fires came, and be content with such species as *Trisetum spicatum* var. *molle*, *Arabis brachycarpa*, and *Cryptogramma Stelleri* in great profusion.

On the last day of our trip, June 26, an excursion to Tobermory and Flowerpot Island enabled us to see the northwestern tip of the peninsula. The twenty mile stretch between McIver and Tobermory was the wildest country we had seen on the peninsula, and offered a new group of plants. Here the contrast between boreal and southern types in the same association was made still more remarkable by the presence of calciphiles and acid loving plants, both equally at home. Limestone barrens covered with *Pinus Banksiana* and *P. resinosa* supported *Danthonia spicata*, *Arctostaphylos Uva-ursi* var. *coactilis*, and *Corcopsis lanceolata*, along with such marked calciphiles as *Ancmonia multifida* var. *hudsoniana*, *Habenaria unalasceensis*, *Senecio obovatus*, and *Asplenium viride*, in great luxuriance in the crevices.

Although our visit to Flowerpot Island was brief, we had time to discover its specialty, *Asplenium cryptolepis*, at one of the stations described by Saunders.¹ Here the writer was astonished to find that the chief companion of this Alleghenian fern on a large boulder was *Poa alpina*, here at its southernmost station in the east.

In going over our collections, I have noticed that the flora of the region includes six different groups of species, each characterized by a different geographic distribution. These are (1) species characteristic of the Rocky Mountains and the Canadian Northwest, which either reach their eastern limit on this peninsula, or are rare and local eastward, except in the region about the Gulf of St. Lawrence; (2) species characteristic of the Central States, particularly the upper Mississippi Valley; (3) species characteristic of the Alleghenian region, with a few typical of the Atlantic Coastal Plain, here at or near the northern limit of their range; (4) species characteristic of northern Canada, and for the most part general circumpolar types, here at or near their southern limit; (5) species endemic to the upper Great Lakes region, and (6) species characteristic of the Canadian flora. These groups will be considered in turn, with lists of the most interesting species that compose them, including the localities at which each species was seen by our party. Most of them are already known from the penin-

¹ Saunders, W. E. Ferns by the Georgian Bay. *Am. Fern Jour.* 19: 49-51. 1929.

sula through the collections and writings of Macoun,¹ Klugh,² Saunders (l. c.) Morris and Eames,³ Fassett,⁴ and others. A few species of considerable interest which we did not see are included, these being in brackets.

Rocky Mountain Types. These comprise the most unusual element in the flora of the region, which has made it famous botanically. They include the following:

[CRYPTOGRAMMA Densa (Brack.) Diels.] Durham, Grey county, about fifty miles south of the Bruce proper. Not collected in recent years, but should be looked for on the unburned spots along the east side of the peninsula.

FESTUCA OCCIDENTALIS Hook. Abundant in damp woods, Red Bay and Oliphant, where first noted by Klugh.

[BROMELICA SMITHII (Porter) Farwell.] Found by Klugh in rich woods on the eastern side of the peninsula, but not seen by our party.

CAREX RICHARDSONII R. Br. Abundant in open woods near the shore, in both dry and damp places, and occasionally entering the marl bogs.

The distribution of this sedge, as described by Fernald,⁵ seems to the writer good evidence that it, along with others of the species here listed, has migrated eastward in post-glacial times, following near the front of the retreating ice sheet, a belief which will be discussed more fully below. Widespread, though local, in its western distribution, it becomes rarer and rarer eastward, with a more and more limited range north and south, until at its eastern limit there are but two widely separated stations for it, one in New York and one in Vermont. A similar range was noted by Darlington⁶ for certain species of beetles, and explained on this basis. Darlington observed also that these post-glacial migrants from the west are found, "in the east, almost entirely upon recently glaciated territory." In Wisconsin, where the extent of the last ice sheet is well known, the distribution of

¹ Macoun, John, and Gibson, J. Synopsis of the Flora of the Valley of the St. Lawrence and the Great Lakes with descriptions of the rarer plants. Can. Jour. (II) 14. 1877.

² Klugh, A. B. Plant Formations of the Bruce Peninsula. Ont. Nat. Sci. Bull. no. 7: 10-21. 1911.

³ Morris, F. and Eames, E. A. Our Wild Orchids. 1929.

⁴ Fassett, N. C. Notes from the Herbarium of the University of Wisconsin. RHODORA 35: 387-391. 1933.

⁵ Fernald, M. L. Carex Richardsonii in New England. RHODORA 34: 229-232. 1932.

⁶ Darlington, P. J. The Cicindelid and Carabid beetles of Central New Hampshire with Special Reference to the Geographical Relationships of the Mountain Fauna. Diss. Harvard University; cf. Harvard University, summaries of Ph.D. Theses, 1931. p. 22.

Carex Richardsonii was noted by Wadmond.¹ The three stations listed by him are scattered through the southeastern part of the state, which was covered by the Wisconsin ice sheet, but none are in the famous driftless area of southwestern Wisconsin. On the Bruce Peninsula, where the western species are a well marked element in the flora, *Carex Richardsonii* is not rare, but in its abundance in some parts of the Canadian woodland suggested to the writer the aspect of *C. novae-angliae* in northern, and *C. pennsylvanica* in southern New England.

HABENARIA UNALASCENSIS (Spreng.) Wats. Lion's Head; south-east of Gillie's Lake; north of McIver; Flowerpot Island. Immature plants, probably of this species, were seen at Red Bay.

With the exception of the first, called to my attention by W. R. Watson, these are all, so far as I can determine from available records, new stations, and indicate the widespread distribution of this species on the peninsula. Except on Flowerpot Island, it was found in second or third growth woodland, mostly of scrubby poplars, birches, and balsam fir, and it is apparently aggressive enough to enter regularly into burned or cut-over areas.

EPIPACTIS DECIPIENS (Hook.) Ames. Flowerpot Island.

Plants immature, but undoubtedly of this species, the abundance and luxuriance of which on the peninsula has been vividly described by Morris and Eames.

CORALLORRHIZA STRIATA Lindl. Abundant and well known from the woods about Howdenvale, Red Bay, and elsewhere.

EPILOBIUM LEPTOCARPUM Haussk. var. MACOUNII Trel. (Det. M. L. Fernald.) Damp, shaded boulders under cliffs, north of Lion's Head.

As noted above, this species is not known elsewhere east of Athabasca except in Newfoundland.

[*E. PANICULATUM* Nutt.] Bruce Peninsula, Macoun; Barrow Bay, Fassett. Not seen by our party.

OSMORHIZA DIVARICATA Nutt. Abundant in woods, Red Bay; Oliphant; Flowerpot Island.

Fassett notes that this species is common in other areas of the Great Lakes region.

Most of these species are found in other localities in the region about the upper Great Lakes, such as northern Michigan and the north shore of Lake Superior, but the majority reach their eastern limit on or near the Bruce, except for their occurrence about the Gulf of St.

¹ Wadmond, S. C. Notes from Southeastern Wisconsin. RHODORA 35:p.253. 1933.

Lawrence, in or near areas not covered by the last, or Wisconsin glaciation. Since in these latter regions they are, as Fernald¹ has so clearly pointed out, relics of a preglacial flora, the question has naturally arisen as to whether this is also true of their occurrence in the Great Lakes region. That most, if not all, of the Bruce Peninsula has at some time been occupied by an ice sheet was the opinion of our party, although we were not qualified to judge the age of the glaciation. There may be areas which were covered only by pre-Wisconsin ice-sheets, on which relic species could have persisted throughout the time of the Wisconsin glaciation.² Fernald's suggestion (l. c. pp. 317-318) that these western species existed in the unglaciated region of Wisconsin and the neighboring states during the Wisconsin glaciation, and migrated out from there in post-glacial time is considered improbable by Fassett.³ Another possibility is that an unglaciated area, as yet not recognized, exists on the north shore of Lake Superior or Lake Huron, or in northern Michigan. The fourth possibility is the suggestion of Fernald (l. c. p. 292) that some of these species might have migrated eastward from the Rocky Mountains in post-glacial time. This seems to the writer the most likely one for those western species which are widespread in the upper Great Lakes region.

Their present absence from most of the territory between the Great Lakes and the Rocky Mountain region could be explained by the disappearance of the woods from this region, with the advent of a warmer, drier climate. Evidence that extensive woodland existed in what is now the prairie region of Nebraska is given by Bowman.⁴

That the Bruce Peninsula is the eastern limit of this post-glacial migration for all except two or three species could be explained by the fact that the limestone strata which produce the favorable soil for most of these plants turn sharply southward at this point, and that the region to the eastward is underlain for the most part by silicious rock, supporting a sterile, acid soil, quite unfavorable to most of the species of this list, and blocking effectively their migration eastward. Their progress southward was undoubtedly blocked by competition with the aggressive Canadian and Alleghenian species migrating

¹ Fernald, M. L. Persistence of Plants in Unglaciated Areas of Boreal America. *Mem. Am. Acad.* 15. 1925.

² Since this article went to press, Dr. Fernald (in lit.) has called to the writer's attention Prof. A. P. Coleman's conclusion that such areas exist. Nevertheless, it seems unlikely that these nunataks were large enough to support a Canadian woodland flora, which would include such species as those mentioned above.

³ Fassett, N. C. Notes from the Herbarium of the University of Wisconsin, *RHODORA* 33: 224-228. 1931.

⁴ Bowman, I. *Forest Physiography*, p. 428. 1911.

northward along these same limestone strata. Significantly, the only species found to the eastward, except in the Gulf of St. Lawrence region, are *Epipactis decipiens*, which is "found chiefly on granites and schists" (Fernald l. c. p. 288), *Corallorrhiza striata*, a saprophyte, and hence comparatively independent of soil conditions, and *Carex Richardsonii*, excessively rare southeast, but not found east or northeast, of this peninsula. Furthermore, these ten species which occur at the eastern limit of the upper Great Lakes region are all equipped with efficient means of dispersal, either by wind (*Cryptogramma densa* with light spores; *Habenaria unalascensis*, *Epipactis decipiens*, and *Corallorrhiza striata* with light, wind-blown seeds; the species of *Epilobium* with comose seeds); or by animals (*Festuca occidentalis* and *Bromelica Smithii* with awned florets, *Carex Richardsonii* with rough pubescent perigynia, *Osmorhiza divaricata* with bristly fruits) and could therefore be expected to migrate rapidly.

Plants characteristic of the Central States, particularly the upper Mississippi Valley, include the following:

IRIS VIRGINICA L. Borders of Isaac Lake and Sky Lake. Determination verified by Dr. Edgar Anderson.

The fact that the two lakes beside which this Iris occurs in great abundance are surrounded by old lake terraces twenty or thirty feet above their present level, and may once have been part of a bay of Lake Huron, recalls the distribution of this species in northern Michigan, as recorded by Anderson,¹ where it is practically confined to old lake basins.

ARENARIA STRICTA Michx. Very abundant on limestone barrens, Oliphant; Red Bay; Howdenvale; Pike Bay; and elsewhere. Growing in exposed situations is a form with short leaves and dense cymes which approaches the southwestern var. *texana* Robinson.

ASTRAGALUS NEGLECTUS (T. & G.) Sheldon. Common in gravelly thickets on Cape Croker, and on the limestone barrens about Gillie's Lake and McIver. First noted by Macoun.

CEANOTHUS OVATUS Desf. Limestone barrens south of Gillie's Lake; between McIver and Tobermory. The Bruce Peninsula specimens approach var. *pubescens* T. & G. of the central states.

[LITHOSPERMUM GMEINI (Michx.) Hitchc.] Oliphant, Morris and Eames.

HOUSTONIA CILIOLATA Torr. Very common along the shore, Oliphant; Red Bay; and Howdenvale.

¹ Anderson, E. A. The Distribution of *Iris versicolor* in Relation to the Post Glacial Great Lakes. RHODORA 35: 154-160. 1933.

COREOPSIS LANCEOLATA L. Limestone barrens between McIver and Tobermory.

C. LANCEOLATA var. *VILLOSA* Michx. With the typical form, near McIver.

The range of this variety, as stated in Gray's Manual, 7th edition, is "Ill. and Mo. to Fla.," considerably southwest of the Bruce Peninsula.

ACHILLEA MILLEFOLIUM L. var. *LANULOSA* (Nutt.) Piper. Shore of Flowerpot Island, where unquestionably native.

CACALIA TUBEROSA Nutt. Wet swales, Oliphant and Red Bay.

Most of these species are characteristic of the open swales and wet shores of the southwestern part of the peninsula, and undoubtedly reached it by northward migration along the shore of Lake Huron.

The Alleghenian types form the dominant vegetation in much of the interior of the peninsula. Most of them are common in Ontario, and range somewhat north of the Bruce Peninsula, but a few, of a more southerly range, are listed here.

PELLAEA ATROPURPUREA (L.) Link. Cliffs facing Georgian Bay, north of Dyer's Bay; cliffs north of Lion's Head.

The first records for this species in Ontario (fide T. M. C. Taylor in litt.), although its close relative, *P. glabella* Mett., is common in suitable places.

ASPLENIUM CRYPTOLEPIS Fernald. To the stations already known on Manitoulin and Flowerpot Islands may be added; boulders at foot of cliffs facing Georgian Bay, north of Dyer's Bay; cliff crests south of Lion's Head. It is very likely scattered all along the cliffs on the eastern side of the peninsula.

SISYRINCHIUM MUCRONATUM Michx. Abundant along the shore, Cape Croker; Red Bay; and Oliphant.

[*SCLERIA VERTICILLATA* Muhl.] Oliphant. Klugh.

SILENE ANTIRRHINA L. Cape Croker.

SENECIO OBOVATUS Muhl. Damp woods, Oliphant; Red Bay; Howdenvale; also abundant on limestone barrens throughout the north end of the peninsula.

The woodland form blooms later than that on the barrens, and has larger, more coarsely crenate leaves.

These species must have migrated into the peninsula from the south, following in general the line of the Niagara escarpment.

The species endemic to the Great Lakes region were few. These were:

IRIS LACUSTRIS Nutt. Very abundant in damp woods and open places along the west shore of the peninsula.

PRIMULA INTERCEDENS Fernald. Common in crevices and gravelly hollows along the west shore. Very variable, and in shaded or damp places apparently intergrading with *P. mistassinica*.

ANTENNARIA FARWELLII Greene. Gravelly bank near shore of Georgian Bay, north of Dyer's Bay.

The specimens are a good match for the type material from northern Michigan. This rather striking species should be looked for elsewhere in the region about the upper Great Lakes. Its long-petioled, rather distinctly three-nerved leaves, and large (about 9 mm. high) involucre with broad, petaloid bracts serve to distinguish it from *A. neodioica* var. *grandis*, which it resembles most closely. Its involucre resembles those of *A. occidentalis* and *A. petaloidea*, but it is distinguished from both of these species by its short, erect stolons and by the shape of its leaves. The writer has seen the following specimen from Wisconsin, which marks the western limit of its known range: dry basalt outcrop, Chittamo, Washburn County, N. C. Fassett no. 8660. Specimen in the herbarium of the University of Wisconsin.

Of these three endemic species, the first is "too close" (cf. Gray's Manual ed. 7) to the Alleghenian and Carolinian *I. cristata* Ait.; the second is a member of a polymorphic circumpolar group of species, and intergrades with the widespread Canadian *P. mistassinica* Michx.; while the third is one of a group of closely related parthenogenetic species which are dominant and widespread throughout the glaciated area of eastern America. Going through Gray's Manual and a few available later publications, the writer has found sixteen other species endemic to the Great Lakes region in general. Of these, ten belong to the large, polymorphic genera *Sisyrinchium*, *Ribes*, *Crataegus*, *Rosa*, *Hypericum*, and *Solidago*, and are closely related to eastern American types. Three others, *Sisyrinchium hostile* Bicknell, *Erythronium propullans* Gray, and *Cirsium Pitcheri* (Torr.) T. & G. are most nearly related to species which occur in the same region, but whose center of distribution is the Great Plains; one, *Streptopus longipes* Fernald, is very near the Canadian *S. roseus* Michx., while the fifteenth, *Salix syrticola* Fernald, has been treated as identical with the arctic and subarctic *S. adenophylla* Hook. Only one, *Woodsia Cathcartiana* Robinson, is related to Cordilleran species. It is, moreover, of doubtful specific status,¹ belonging to a polymorphic species complex, one member of which, *W. oregana*, is found in the same region. This situation is in striking contrast to that of the numerous endemic

¹ cf. House, H. D. Am. Fern Jour. 23: 2. 1933.

species of eastern Quebec, western Newfoundland, and adjacent areas, which are for the most part very distinctive and most nearly related to Cordilleran or high arctic species. (cf. Fernald l. c. pp. 292–295.) It is further evidence that the relic flora of the Great Lakes is scanty compared to that of the now famous unglaciated regions farther east.

The plants, mostly circumpolar species, characteristic of northern Canada, which are at or near their southern limit on the Bruce, form the dominant vegetation in the open marl bogs, and are abundant also on the rocky shores of the west coast, and the cliffs of the east coast of the peninsula. The following are perhaps the most interesting.

POLYSTICHUM LONCHITIS (L.) Roth. Common along the eastern side of the peninsula as far as Barrow Bay, the most northerly locality at which it was seen.

Two of the other fern specialties of the region, *Thelypteris Filix-mas* and *Scolopendrium vulgare*, were noted at Sidney Bay, Cape Croker, but not farther north.

ASPLENIUM VIRIDE L. Limestone barrens, McIver. Found by Saunders and others in many other localities on the peninsula.

SELAGINELLA SELAGINOIDES (L.) Link. Marl bogs, Red Bay and Oliphant.

POA ALPINA L. Flowerpot Island.

POA sp. Boulders at foot of cliffs, south of Lion's Head.

A species related to *P. glauca*, but with large spikelets, 6–8 mm. long, and the lemmas pubescent below. This is a member of a boreal and Cordilleran group, and may represent another isolated occurrence on the Bruce, but on account of the systematic confusion within the genus it could not be satisfactorily identified.

AGROPYRON TRACHYCAULUM (Link) Malte var. *MAJUS* (Vasey) Fernald. Cape Croker; south of Lion's Head, and elsewhere. Probably of general distribution along the east side of the peninsula.

CAREX SCIRPOIDEA Michx. Common in woods and open places near the shore, Red Bay and Oliphant.

C. CAPILLARIS L. Abundant on borders of marl bogs, Red Bay and Oliphant.

C. GYNOCRATES Wormsk. Center of marl bogs, Red Bay and Oliphant.

C. LIVIDA (Wahlenb.) Willd. var. *GRAYANA* (Dewey) Fernald. Marl bog, Oliphant.

DRABA LANCEOLATA Royle. Cliffs, north of Dyer's Bay; north and south of Lion's Head; Barrow Bay. Reported from the latter locality (as *D. cana*) by Fassett. Apparently general along the cliffs of the eastern shore.

ARABIS BRACHYCARPA (T. & G.) Britton. Barrow Bay.

DROSERA LINEARIS Goldie. Open marl bogs, Red Bay and Oliphant.

POTENTILLA NORVEGICA L. var. LABRADORICA (Lehm.) Fernald. Specimens from crevices in rocks, Round Island, Fishing Islands, are close to this variety (fide M. L. Fernald.)

SENECIO PAUPERculus Michx. The typical form is abundant in exposed places along the shore, Red Bay and Oliphant; and was seen also south of Lion's Head and on Flowerpot Island. Var. *Balsamitae* (Muhl.) Fernald is common everywhere.

Of the plants of general Canadian range, the following are worth noting as new records, to the knowledge of the writer, for the Bruce Peninsula.

POA SALTUENSIS Fernald and Wiegand. Rich woods, Red Bay.

RANUNCULUS SCCELERATUS L. Round Island, Fishing Islands.

SISYMBRIUM BRACHYCARPON Richards. Cape Croker.

AMELANCHIER HUMILIS Wiegand. Cape Croker.

CONVOLVULUS SPITHAMAEUS L. Between McIver and Tobermory.

This is the grayish pubescent form of the species, with broad involucre bracts, and is therefore close to the form referred by Wherry¹ to *C. stans* Michx.

ANTENNARIA OCCIDENTALIS Greene. Cape Croker.

A. PETALOIDEA Fernald. Oliphant.

Specimens of every species collected have been deposited in the Colgate University Herbarium, and in the Gray Herbarium, while duplicates of most of them have been sent to the herbaria of the University of Toronto, the University of Montreal, Cornell University, and elsewhere.

The writer and his colleagues of the expedition wish to express their gratitude to Dr. Thomas M. C. Taylor, Fr. Marie-Victorin, Mr. W. E. Saunders, and Mr. W. H. Watson for helpful information concerning the region visited, to Professor M. L. Fernald, Professor K. M. Wiegand, and Dr. E. A. Anderson for their kind assistance in the identification of the specimens, and to Dr. N. C. Fassett for assistance in obtaining references to literature.²

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¹ Wherry, E. T. Three Shale Barren Plants of Maryland. *Torreyia* 29: 104-107. 1929.

² Since this article has gone to press, I have received word that the following species of the above list, which I believed to have been collected for the first time on the peninsula, have also been found by expeditions from the University of Toronto: *Asplenium cryptolepis*, *Potentilla norvegica* var. *labradorica*, and *Epilobium leptocarpum* var. *Macounii*.

SISYRINCHIUM MUCRONATUM IN PENOBSCOT COUNTY, MAINE.—On the 18th of June, 1933, Dr. Manton Copeland of Bowdoin College, Mr. W. Dale Currier of Caribou, Maine, and the writer were passing through Winn in Penobscot County, when a delay of about ten minutes made it possible to look more carefully at the plants by the roadside near a garage at that place. Growing in shallow soil over a ledge by the east side of the road, at the edge of a wooded area, we noticed a Blue-eyed Grass unlike any of the species we had previously seen growing. It occupied an area less than twelve feet in length. Near it grew the common *Sisyrinchium angustifolium*. We took a few specimens of the stranger, leaving most of the small colony to continue its existence there. Material for a sheet sent to Dr. M. L. Fernald has been identified by him as *Sisyrinchium mucronatum* Michx.

In December Dr. Fernald wrote, "it is the first evidence of the species from east of the Connecticut Valley. In this jump to north-central and eastern Maine it is, therefore, like numerous other species which we already know from Aroostook County and adjacent areas."

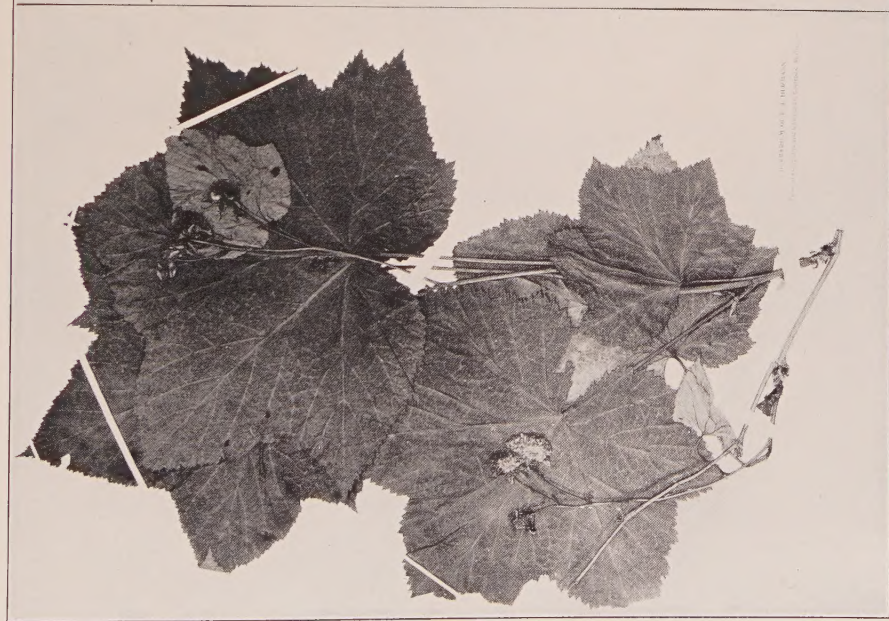
With this interesting information before us, it is needless to state that it is an addition to the flora of Maine.—ARTHUR H. NORTON, Museum of Natural History, Portland, Maine.

LEMNA CYCLOSTASA AN INVALID NAME.—In 1897, in his *North American Lemnaceae*, C. H. Thompson took up for *Lemna valdiviana* Philippi (1864) the name *L. cyclostasa*, ascribing it to "(Ell.) Chev. Fl. Par. 2: 256. 1827. Schleid. Linnaea, 13: 390. 1839." These citations are given in *Index Kewensis* and it seems probable that Thompson, monographing the genus, found it easier to copy from that indispensable but not infallible work than to check the publications himself. In preparing the 7th edition of Gray's Manual Dr. Robinson and I looked carefully into the matter and, as a result, maintained *L. valdiviana*. In the various works emanating from New York, Britton & Brown's Illustrated Flora, Small's Manual and Rydberg's Flora of the Prairies and Plains, the plant is still called, following *Index Kewensis* and Thompson, *L. cyclostasa* (Ell.) Chev. with the reference to vol. ii. 256 (1827).

In reviewing the group for the next edition of Gray's Manual I had again checked the matter and had retained *Lemna valdiviana* as the first valid name for the species; but the persistent acceptance of the

erroneous name by those who should know better makes it desirable to ask them to search Chevalier for any mention whatever of *L. cyclostasa*. Elliott had originally described *L. minor*, var. ? *Cyclostasa*, Ell. Sk. Bot. S. C. and Ga. ii. 518 (1824); but there was no obvious reason why Chevalier, in a flora of Paris, should discuss it, and a fourth raking of his pages shows that he did not do so! As to the reference to Schleiden given by Thompson, after *Index Kewensis*, that was merely the enumeration among the synonyms of *L. minor* of a "*L. cyclostasa* Elliot[t]." But certainly such a citation in the synonymy of *L. minor* does not constitute the publication of *L. cyclostasa* as a valid species, even though, by inference, we can associate the synonymic binomial with Elliott's variety.—M. L. FERNALD.

Volume 37, no. 433, including pages 1 to 32, a portrait and plates 323 to 325, was issued 4 January, 1935.



RUBUS PARVIFLORUS (left) and forma PEDATIFIDUS (right).

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